

MAMMALS

COLLECTED BY

THE SWEDISH ZOOLOGICAL EXPEDITION

TO BRITISH EAST AFRICA 1911

BY

EINAR LÖNNBERG

WITH 15 PLATES AND 6 FIGURES IN THE TEXT

UPPSALA & STOCKHOLM. ALMQVIST & WIKSELLS BOKTRYCKERI-A.-B.

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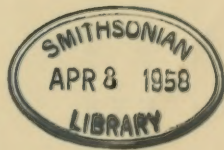
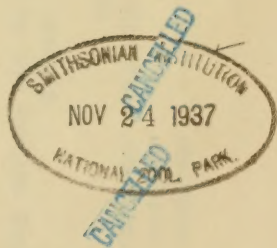
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1912

MANUALS

THE SCOTTISH NORTHERN RAILWAY

TO BRISTOL EAST JUNE 1911



Mamm.

The first collecting of mammals was begun in the end of December 1910. I turned then my attention chiefly to the fauna of the small forests around Nairobi. The acting Governor His Excellency F. J. JACKSON, whose name is so honourably connected with the scientific exploration of East Africa, kindly granted me, among other favours, a personal complimentary license to shoot a certain number of game animals for which great kindness I wish to publicly express my deepfelt gratitude. I keep also in grateful and pleasant remembrance several other gentlemen, among whom, although the others are not forgotten, I especially wish to mention the Provincial Commissioner Mr. C. W. HOBLEY, and the Game Warden Mr. R. B. WOOSNAM, who kindly favoured me with good advice and assistance. The 7th of January I went to Escarpment station and did some collecting there, chiefly in the forests, for six days. In the meantime our caravan, or safari as is the East African expression, had been fitted out under the supervision of Mr. R. J. CUNNINGHAME, and Mr. Å. SJÖGREN, who joined the expedition to shoot game for his own interests, had arrived. We started on our way north the 17th of Jan. 1911 and arrived the following day at Juja farm. In this domain the typical East African steppefauna is beautifully preserved as in a private game reserve, and the owner Mr. W. N. Mc MILLAN kindly presented a Whitebearded Gnu to the scientific collections. From this place we continued our way ²⁰/₁ partly over steppe, and partly through rather densely populated districts via Blue Post, Punda Melia, Fort Hall, Kagio and Kutu to Embu boma. A little trapping was done at every camping place. From Embu we turned towards Mount Kenia and marched for three days through the lower forest region to the Meru country. Only a few mammals were obtained in the forest. We arrived at a native village Kanyakeni the 29th of Jan. and reached Meru boma the following day, where we stayed a couple of days. Several small mammals were obtained there by trapping, and some were also received from the natives as the district commissioner Mr. HORNE kindly had told them that we wanted to buy such. This was almost the only place where the native population was useful in this respect. Some mammals were also shot in the forests near Meru. Meru boma is, according to barometric observation, situated at an altitude of 1775 m. above the sea.

The 2^d of Febr. we left Meru boma and came down on the acacia steppe around Luazomela,¹ Itiulu and Lekiundu rivers, tributaries to Guaso Nyiri from the southern side. In this country we worked until the 13th of Febr. camping at four different places near the rivers mentioned. The altitude of our camp at Lekiundu river, not very far from Guaso Nyiri, was according to the barometer 1150 m. above the sea. The first camp on the acacia steppe at Luazomela river had an altitude of about 1,500 m. The 13th of Febr. we crossed Guaso Nyiri at the ford on the Marsabit road and marched first eastwards down the river a couple of days, and then struck northward through the thornbush country to a water place belonging to the Rendiles. This place, where some holes containing salt water (about this see further below) are dug by the nomades in a dry river bed, is commonly known under the name Njoro, and it is so called in the following, but this means only water or perhaps spring, and there is also another name which according to what CUNNINGHAME tried to make out ought to be written »Kauroo» or something like that. It is situated not fully 1° N. lat. According to barometric observation its altitude is about 750 m. above the sea. We camped at these water holes from the 16th to the 28th of Febr. when we left and returned to Guaso Nyiri via another almost similar water-place, Thera, where, however, the water contained in the holes was quite fresh.

We proceeded to a place situated some distance below Chanler Falls and camped there from the 3^d to the 16th of March when we returned from our easternmost camp in the thornbush country (its altitude according to the barometer is 750 m.) and returned up along Guaso Nyiri to the crossing of the Marsabit road. From this place we went southwards and reached Meru boma the 21st of March. We left this place the 24th and turned towards Mount Kenia. The first camp was near a native village Kazere at an altitude of 2,125 m. The following day we penetrated through the primeval forests and camped at an open place in a small valley 2,500 m. above the sea. We ascended the following day and pitched our camp at an altitude of 2,700 m. in the mixed bamboo and forest-region. The 28th of March we came out again from the forest, not far from Kutu, after having passed through different zones of vegetation on Kenia. The remaining route to Nairobi went via Fort Hall, Punda Melia, Blue Post, Roiru river and Rooruka river. The 5th of April in the morning we were back in Nairobi. During the following days many things had to be atten-

¹ The native local names are spelt phonetically (not english) as far as I with the assistance of Mr. CUNNINGHAME could make it out. It is, however, very difficult to find out the proper spelling of some words because to many native tribes *r* and *l* are the same. They say for instance sometimes »sungura» (= Hare) and sometimes »sungula»; river and liver sound identical to them. In a similar way they use *g* and *k*, or *b* and *p* for the same word, for instance »ndege» (= bird) and »ndeke», »habana» (= no) and »hapana» are different pronunciations of the same words. I therefore suspect that what I have called Luazomela is the same river which PATTERSON (»In the Grip of the Nyika») has written »Guaso Mara». He has probably spelt the name after english pronunciation, and it would then be »Guaso Mera» if phonetically spelt. But in the native tongue »Mela» and »Mera» is the same thing. »Guaso Mela» and »Luazomela» are thus almost alike except for the first letter. From the analogy with Guaso Nyiri it might even be supposed that »Guaso Mela» is more correct than »Luazomela», but both to CUNNINGHAME and to me the word sounded as the latter writing indicates. I have, however, not enough knowledge of African philology to decide the question.

The name Guaso Nyiri certainly sounded in my ear as I have written it here; in spite of the numerous different spellings like »Eusso Nyiri» etc. which have appeared even in print.

ded to, but I found time to do a little collecting in the neighbourhood now and then, till we left Nairobi for Mombasa the 14th of April and the expedition was finished.

The collection of mammals contains about 420 specimens, in size from Shrew to Elephant, not counting a number of extra skulls. The complete skeletons of many of these specimens have been preserved, even those of Elephant, Rhinoceros, Grévy's zebra, Giraffe, Buffaloes etc.

In addition to this dry collection there are also a number of specimens small adult mammals as well as foetuses and preparates of big ones preserved in alcohol and formaline for anatomical work. About 110 different species and subspecies are represented. A few more species were observed and are therefore mentioned below, although material of them was not obtained.

The taxidermic work was done by Mr. A. JANSSON, taxidermist at the R. Nat. Hist. Museum, Stockholm, with assistance of natives. But I am also deeply grateful to Mr. R. J. CUNNINGHAME for his extremely valuable assistance especially in preserving the hides of the great mammals which thanks to his own work and that of the by him trained men are in a first class condition.

Mr. A. SJÖGREN kindly presented two heads and three entire mammals shot by him to the scientific collections. I had also the pleasure of receiving a skull of a *Hylocharus* from Mrs & Mr. SANDBACK-BAKER, a skull of a Jackal from Mr. SETH SMITH, a *Pedetes* from Mr. HOBLEY, a *Lophiomys* from Mr. HENDERSON, a pair of tusks of a female Elephant from Mr. WOOSNAM. I am also obliged to Mr. KLEIN for kind help with the preservation of some skins of antelopes shot the last days of my stay at Nairobi. The services rendered during the whole expedition by Messrs. NEWLAND, TARLTON & Co are also gratefully acknowledged.

The costs of the expedition were chiefly defrayed by a friend of mine, who does not want his name mentioned in this connection, and by His Excellency Dr. EMANUEL NOBEL. To these two gentlemen I wish to express my deepfelt gratitude for their generosity, but I keep also in grateful memory kind services rendered by other friends as well.

My whole sojourn in British East Africa did not extend over more than about three months and three weeks including the time for all travels and long marches. I had not only to pay attention to the mammals but to birds and other vertebrates¹ as well, and collected also a number of lower animals. The deficiencies of the work may therefore to some extent be explained by this.

From a biotopographical point of view the country in which this expedition collected mammals can be divided in a number of landscape types which offer different conditions of life, and in consequence of this are inhabited by certain mammals. As I have set forth in my memoir² on the birds collected by this expedition, there

¹ Conf. the Report on the »Birds» K. Vet. Akad. Handl. Bd 47 N:o 5, and on the »Reptiles, Batrachians and Fishes» ibid N:o 6.

² K. Sv Vet. Akad. Handl. Bd 47 nr 5 p.

were, before mankind altered the natural conditions in East Africa probably three different kinds of main types of landscape which with their different subtypes, or gradations and intergradations, more or less mixed, occupied the greatest part of the country. These principal kinds of landscape are, or rather were, steppe, thorn-bush and forest and to this has now to be added the more or less cultivated country with 'shambas' or neglected and overgrown former shambas.

This last type of landscape occupies vast areas, especially in the Kikuyu- and Meru countries. But the mammals living in the shambas and their surroundings, although now in many cases characteristic of the shamba country, are late immigrants from steppe, or forest and bush. They have found plenty of food there and have come to feed on the crops, or on other animals attracted by the crops. The fauna of the shamba country has accordingly not originated there, and it has not been subjected to special adaptations to live in such surroundings. A great number especially of the somewhat larger mammals only make raids into the shambas, like the baboons, bushpigs, bushbucks, duikers and other antelopes, porcupines, etc. not to speak of the giants, the elephants, and they retire again to their hiding places in bush or forest. But also the recent farmers on the open plains have found that some members of the steppe fauna like zebras and hartebeests etc. may make invasions and be destructive to their crops as well. Permanent residents in and at the shambas are a number of rodents and small carnivores, but these can also be found elsewhere, even if they, thanks to the abundance of food in such localities, become more numerous there. Thus, from a biotopographical point of view the mammals of the shamba country do not form a faunistic unit of their own. They are invaders from elsewhere, just as the rats (*Epimys panya*, *E. effectus*, *E. medicatus*, *E. rattus* etc.) which live in and at the native dwellings.

The shambas are also different in different places according to the crops grown there. In the Kikuyu country where the crop chiefly consists of beans, sweet potatoes, maize, *Pennisetum*, and other kinds of grain they do not offer suitable conditions for any arboreal animals, and not many hiding places except for quite small mammals. The others have to take their refuge in the bush covering former shambas or other suitable places and there as well small antelopes (duikers etc.) as carnivorous animals find shelter. In the Meru country where the shambas oftener contain bananas, and above all a number of small trees supporting the *Dioscorea*-vines even arboreal animals like the 'tumbili'-monkey (*Cercopithecus pygerythrus*) and the small Squirrel (*Paraxerus jacksoni kahari*) feel at home. In addition to this the numerous hedges of spiny *Solanums*, large *Salvias* etc. form good hiding places for some mammals like Mongoose, Genets etc. But the cultivated area has not given any new addition to the fauna neither in Kikuyu nor in Meru, even if many species now are more abundant in such country than elsewhere. In the following list of mammals such species are enumerated as were collected or observed in or at cultivated land.

The steppe may be regarded as the most typical landscape in great parts of British East Africa but it exhibits a number of different modifications. The flat open plains like the Athi plains near Nairobi and at Juja with a sometimes scanty,

Distribution of the genus or subgenus	Distribution of the species and closely allied forms	Mammals in cultivated or formerly cultivated land.
A ¹	E.	<i>Cercopithecus pygerythrus luteus</i> ELLIOT in trees, Meru boma, Kanyakeni.
A	At.	<i>Papio anubis</i> subsp. Escarpment, Nairobi.
A	E.	<i>Crocidura martinsseni</i> NEUMANN Meru country, near Kenia forest.
"	E Wc	" <i>fumosa</i> THOMAS Blue Post, Kagio, Embu, Kanyakeni.
"	E.	" <i>hildegardæ</i> THOMAS Blue Post, Kutu, Kazero.
A	E.	<i>Genetta suahelica</i> MATSCHIE Meru boma.
"	E Wc	" <i>stuhmanni</i> MATSCHIE Embu boma.
A	E (a)	<i>Mungos sanguineus ibea</i> WROUGHTON Port Hall, Kutu.
"	A	" <i>paludinosus</i> conf. <i>mitis</i> Nairobi.
A	E (A)	<i>Ichneumia albicauda ibeanus</i> THOMAS Kikuyu.
A	Ea	<i>Felis ocreata</i> subsp. Kagio.
A	E.	<i>Paraxerus jacksoni kahari</i> (HELLER) Mera boma, in trees.
A	E.	<i>Graphiurus parvus dollmani</i> OSGOOD Kutu.
Ea Wc	E(ni)	<i>Otomys angoniensis classadon</i> OSGOOD Kutu.
A	E Wc	<i>Dendromys insignis</i> THOMAS Kutu, Kazero.
A	cosmopolitan	<i>Epimys rattus</i> LINNÆUS Nairobi.
"	E.	" <i>medicatus</i> WROUGHTON Meru boma.
"	E.	" <i>hindæ</i> THOMAS Ruiru river.
"	E.	" <i>effectus</i> DOLLMAN Fort Hall to Luazomela.
"	E.	" <i>panya</i> HELLER Juja—Fort Hall.
E	E.	<i>Zelotomys hildegardæ</i> THOMAS Ruiru river.
A	Eni(no)	<i>Leggada bella</i> THOMAS Punda Melia.
"	E Wc	" <i>triton</i> " Kazero.
"	E. (Wc)	" <i>murilla</i> THOMAS Blue Post.
At.	E. Wc	<i>Lophuromys aquilus zena</i> DOLLMAN Embu, Kutu.
A	E (no)	<i>Arvicanthus abyssinicus præceps</i> WROUGHTON Fort Hall.
"	E Wc (At)	" <i>pulchellus massaicus</i> (PAGENST.) Kikuyu and Meru countries.
Eno	E(no)	<i>Tachyoryctes splendens ibeanus</i> THOMAS Nairobi, Moru.
A	E.	<i>Hystrix galeata</i> THOMAS Nairobi Escarpment.
A	E(a)	<i>Potamocheilus cheropotamus kenia</i> LÖNNBERG Nairobi.
A	E(no)	<i>Cephalophus abyssinicus hindæ</i> WROUGHTON Nairobi, Punda Melia.
A	E.	<i>Tragelaphus Maywoodi</i> THOMAS Escarpment.
A	?	<i>Orycteropus</i> sp. Nairobi.

sometimes rich growth of grass, and with hardly any or only a few widely scattered acacia bushes constitute the pasture-lands of many antelopes. The most common of all of these is Coke's Hartebeest, the »Kongoni», which still is numerous even quite near Nairobi. Its peculiar silhouette, ungainly as if carved in wood, is often seen against the sky-line and then, especially if a Kongoni has climbed up on the top of a termite hill, it often looks almost like a monstrous giant bird until its four

¹ In this and following tables A = Ethiopian region, At = widely distributed across tropical Africa, E = East Africa s. str., Ea = all over East Africa, Eni = East Africa s. str. to Nyassaland, Ez = East Africa to the Zambesidistrict, Es = East Africa to South Africa, Eno = East Africa and northward, S = Somaliland, Wc = Central African lake district, W = West African forest region.

legs are used in a stiff jointed gallop when its wariness gets the upper hand of its curiosity. The pretty little Thomson's Gazelles are also still rather common, although strongly decimated near settled districts. At Juja farm Whitebearded Gnus and Grant's Gazelles which also are typical members of this fauna were seen. The Zebras are together with the Kongonis with which they often join in mixed herds the most numerous mammals on these open plains, but they constitute also the only species of those hitherto mentioned which (without modification) extends north of Tana river. Along water courses on the steppe where there is bush or other covert Impalas and Waterbucks are at home, and perhaps also a Reedbuck. Here on the steppe among the big grazing animals the Lion hunts its prey, and the carrion feeding Hyenas (*Crocotta panganeensis* (?) and *Hyana schillingsi*), and Jackals (*Canis adustus* and *C. mesomelas*) share with the Vultures the remains. The Cheetah is also seen on the open steppe. *Pedetes* and *Otocyon* appear to inhabit the open plains, although their nocturnal habits are not easily studied. Where the growth of grass is rich and the bushes become numerous so that the landscape can be termed bush steppe the Serval, the Cheetah, the Wild Cat, Mongooses, and even the Lion and Leopard find suitable covert. The Duiker (*Cephalophus abyssinicus hindei*) is fond of hiding in high grass, and the Steinbocks (*Raphicercus*) which I saw were all found on bush steppe. In similar localities Warthogs are found, although they visit the open steppe as well. The Zebras and Kongonis also enter the bush steppe, if the bushes are not too numerous. The Hares (*Lepus victoriarum* and *L. crassus*) lie up in patches of high grass or among tall herbs and bushes which as a rule grow on old termite hills which are deserted and have fallen down. Similar resting places are sometimes selected by Duikers, Wild Cats and others. Certain rodents like *Arvicanthus*, *Zelotomys*, *Otomys*, *Tachygorytes* etc. inhabit the steppe as well as insectivores, chiefly of the genus *Crocidura*. But as the expedition only passed over a short stretch of these plains and only camped there a few days the collection of small mammals from this district does not give any fair idea of the fauna. Several species caught in the cultivated land and enumerated in the list above live also in the bush- and grass steppe. Along rivers and small water-courses in the steppe country there is often a fringe of trees and there is the home of the «Tumbili» monkeys (*Cercopithecus pygerythrus*).

The steppe country south of Guaso Nyiri which we visited is mostly covered with scattered flat topped acacias, although here and there broad stretches of open grassy plains extend, and in some places also patches of thornbush are found. On the grass-covered plains the soil is often very loose but sometimes hard and dusty like a country road, so that a cloud of dust rises when the big game animals move. Among the acacias the ground as a rule is thickly strewn with sharp-edged black stones of volcanic origin, but there is often a rich growth of grass if the stones do not absolutely cover the ground which sometimes is the case.¹ In the thornbush patches the soil is hard and dry often with very little vegetation except the bushes,

¹ A photo of a typical acaciasteppe with grass and such black stones is reproduced in the report on the birds of this expedition K. Sv. Vet. Akad. Handl. Bd. 47. No 5. Pl. 1, fig. 2, while fig. 1 on the same plate shows a more open steppe.

although grass-covered spots can be found within the thornbush as well. This country is comparatively well watered by the small tributaries, Itiolu, Luazomela and Lekundu, to Guaso Nyiri.

The fauna of this district is not identical with that of the Athi plains. One especially misses there the Kongoni, Whitebearded Gnu and Thomson's Gazelle, which are so characteristic of the latter. Grant's Gazelle of the Guaso Nyiri steppe belongs to another race and probably this is the case with the Impala and the Waterbuck found among the bushes at the small rivers mentioned, although material of these animals for comparison was not collected on the Athi plains. In fact among the big grazing mammals, which are common on the latter, only the Zebra appears to be the same in the northern district. The Oryx (*O. beisa annectens*), the Gerenuk, Grévy's Zebra and the Somali Giraffe (*G. c. reticulata*) prove by their presence that here is a different zoogeographical territory. Pattersons Eland is also found on these plains, although not common, and the big black Buffaloes inhabit suitable thornbush patches. The Rhinoceros is not uncommon as well on the open ground as among bush and under the acacias. Of carnivorous animals Lion, Leopard, Cheetah, and Hyenas are represented. The Porcupine is of the *H. galeata* type which inhabits the more southern parts of Brit. East Africa as well, but the Hare (*Lepus somalensis*) of the Guaso Nyiri country is an entirely different type, a member of the Somalifauna. To the latter belongs also the Ground Squirrel the colonies of which inhabit dry places. The *Otomys* is the same as further south, but the *Arvicanthis* is different (*A. somalicus reptans*). Among other small rodents may be mentioned a Spiny Mouse (*Acomys ablutus*) apparently characteristic of this locality, *Thamnomys oblitus*, *Saccostomus mearnsi* and *Dasymys savannus*. A new *Sylvisorex* and a *Crocidura* represent the shrews.

Baboons occurred in large troops at Luazomela river on bush steppe. The Yellow-winged bat (*Lavia frons*) used to hang in thornbushes. Quite small bats were seen in some places after sunset but none was secured.

The following list gives the names of the mammals collected or observed by this expedition in steppe country as well near Nairobi as just south of Guaso Nyiri, and the differences of the faunas at these two localities is to some extent elucidated by this, although, of course, several names could have been added if the time at our disposal had not been so short.

In such cases when the name or the * mark is put within parenthesis exact identification of the subspecies has not been made.

Distribution of genus or subgenus	Distribution of species and closely allied forms	Steppe-mammals	Plains S. of Tana river		Acacia steppe S. of Guaso Nyiri
			grass- or bush steppe	open steppe	
A.	E.	<i>Cercopithecus pygerythrus luteus</i> ELLIOT . . . . .	.	.	+
"	At.	<i>Papio anubis</i> subsp.	(+)	(+)	(bush)
"	Es.	<i>Epomophorus wahlbergi</i> SUNDEVALL . . . . .	.	.	(bush)
At.	At.	<i>Lavia frons frons</i> (GEOFFROY) . . . . .	.	.	(bush)
"	E(ni).	<i>Sylvioorex sorelloides</i> LÖNNBERG . . . . .	.	.	+
A.	Eni.	<i>Crociodura turba</i> DOLLMAN . . . . .	.	.	+
"	E.	" <i>hindei</i> THOMAS	+	.	.
"	Ea.	<i>Canis mesomelas</i> SCHREBER	+	+	?
"	EsW.	" <i>adustus</i> SUNDEVALL	+	+	?
Ea.	E(a).	<i>Otocyon megalotis virgatus</i> (MILLER) . . . . .	.	+	.
A.	E.	<i>Crocotta panganensis</i> LÖNNBERG . . . . .	.	+	.
"	"	(<i>Crocotta</i> sp.) . . . . .	.	.	(+)
Ea.	"	<i>Hyena schillingsi</i> MATSCHIE . . . . .	.	+	.
A.	E(a).	<i>Mungos sanguineus ibae</i> WROUGHTON	+	.	.
"	Ea.	<i>Felis ocreata</i> subsp.	+	.	.
"	E.	(<i>Felis leo sabakiensis</i> LÖNNBERG)	+	+	+
"	A.	" <i>pardus</i> LIN.	+	.	+
"	E(a).	" <i>capensis hindei</i> WROUGHTON	+	.	.
"	Ea.	" <i>caracal nubica</i> (FITZINGER) MATSCHIE . . . . .	.	+	.
Ea.	"	<i>Cynelurus jubatus guttatus</i> (HERMANN)	+	+	+
Eno.	S.	<i>Xerus rutilus dabagala</i> (HEUGLIN) . . . . .	.	.	+
EAWc.	E(ni).	<i>Otomys angoniensis elassodon</i> OSGOOD	+	.	+
"	E.	<i>Thamnomys oblitus</i> OSGOOD . . . . .	.	.	+
E.	"	<i>Zelotomys hildegardeae</i> THOMAS	+	.	+
A.	E(s).	<i>Saccostomus mearnsi</i> HELLER . . . . .	.	.	+
"	"	<i>Acomys ablutus</i> DOLLMAN . . . . .	.	.	+
"	E.	<i>Dasytnys savannus</i> HELLER . . . . .	.	.	+
"	E(no).	<i>Arvicanthus abyssinicus nairobi</i> (ALLEN)	+	.	.
"	S.	" <i>somaticus reptans</i> (DOLLMAN) . . . . .	.	.	+
Eno.	E(no).	<i>Tachyoryctes splendens ibeanus</i> THOMAS	+	.	.
Es.	E(s).	<i>Pedetes surdaster</i> THOMAS . . . . .	.	+	.
A.	E.	<i>Hystrix galeata</i> THOMAS	+	.	+
Ea.	"	<i>Lepus victoriae</i> THOMAS	+	+	.
"	"	" <i>cravshayi</i> DE WINTON	+	+	.
"	S.	" <i>somalensis</i> HEUGLIN . . . . .	.	.	+
"	Ea.	<i>Rhinoceros (Diceros) bicornis</i> LIN.	+	+	+
"	E(s).	<i>Equus burchelli bohmi</i> MATSCHIE (v. <i>granti</i>)	+	+	+
"	S.	" <i>grevyi</i> OUSTALET (<i>faurei</i> MATSCHIE?) . . . . .	.	.	+
A.	—	<i>Phacocherus africanus</i> subsp.?	+	+	.
"	—	<i>Giraffa camelopardalis reticulata</i> DE WINTON . . . . .	.	.	+
Ea.	E.	<i>Bubalis cockei</i> GÜNTHER	+	+	.
Es.	"	<i>Connochetes albojubatus</i> THOMAS . . . . .	.	+	.
A.	E(no).	<i>Cephalophus abyssinicus hindei</i> WROUGHTON	+	.	.
Es.	E.	<i>Rhaphicerus neumanni</i> MATSCHIE	+	.	.
—	—	(<i>Kobus ellipsiprymnus</i> subsp.)	(+)	.	.

Distribution of genus or subgenus	Distribution of species and closely allied forms	Steppe-mammals	Plains S. of Tana river		Acacia steppe S. of Guaso Nyiri
			grasses- or bush steppe	open steppe	
A.	E (S).	<i>Kobus ellipsiprymnus canescens</i> LÖNNBERG . . . . .	.	.	+
"	—	(<i>Redunca</i> sp.)	(+)	.	.
Er.	E (S).	<i>Epyceros melampus (reudilis)</i> LÖNNB. . . . .	.	(+)	+
Ea.	E.	<i>Gazella thomsoni</i> GÜNTHER . . . . .	.	+	.
"	"	<i>granti</i> BROOKE . . . . .	.	+	.
"	S(c).	<i>" lacuum</i> NEUMANN . . . . .	.	.	+
Se.	Se.	<i>Lithocranius walleri</i> (BROOKE) . . . . .	.	.	+
Ea.	S.	<i>Oryz beisa annectens</i> HOLLISTER . . . . .	.	.	+
"	E.	<i>Taurotragus oryx pattersonianus</i> LYDECKER . . . . .	.	.	+
A.	E(s).	<i>Buffelus caffer radcliffi</i> THOMAS . . . . .	.	.	+
"	—	<i>Orycteropus</i> subsp. . . . .	.	+	.

On the northern side of Guaso Nyiri the landscape is quite different from that of the southern side. The river forms to a great extent a geological boundary line between the southern formerly volcanic district, and the northern with archaic rocks and gravel. It is true that in some few places the black lava extends across the present river-bed so that the river has had to cut itself a canyon through these black rocks, as is the case at and below Chanler Falls. At such places there are certain areas strewn with the sharp-edged, slag-like stones also on the northern side of the river. On the whole, however, the ground there consists of very hard-packed gravel, so hard indeed that not even the foot of an Elephant or a Rhinoceros makes any visible impression. This gravel is mostly somewhat rust-coloured but in some places quartz stones are numerous. In some localities the soil is more sandy, especially near the river. The ground is then, by the tramping and treading of many generations of game animals, covered with a layer of dust in which the spoor is plainly printed. The same is also the case in the numerous game paths which lead down to the river. The type of vegetation is thornbush, and it consists of a great number of mostly thorny, spiny, and prickly bushes of many different kinds. A common kind is a funnel-shaped acacia 3—4 m. in height, or more, with a narrow base but a broad, flat top. Other acacia-bushes have long slender branches and twigs with small but sharp hooks. Some bushes have thick branches with yellowish bark, others have dark brown bark, but the prevailing colour in the leafless thornbush is grey. Many different families and genera of bushes are represented in this landscape, but during the dry season when all branches are bare and naked it is difficult to form any opinion about them. Some acacias showed their yellow cylindrical flower brushes, slightly reminding about willows. A small pale greyish bush displayed pink flowers with crimson inside, shaped as those of a *Convolvulus*. Once I saw large yellow flowers in the top of a big bush and a few times large crimson flowers.

Some slender bushes have dry yellow berries with hard seeds. These berries have a sweetish taste somewhat like raisins, but I did not observe if they were eaten.

A plumlike fruit of the size and shape of an olive with a flat wrinkled stone and with aromatic taste, although very adstringent before it is ripe, is much liked by the Baboons. This bush has long thorns and the new, still very small leaves were seen a few times and found to be pinnate. Another very common bush has a kind of peculiar berries of the size of large pease. These sit on the upper side of the branches and contain a hard seed in the centre, but between that and the exterior brownish cover is a milky looking, very resinous and sticky but aromatic juice. These berries were eaten in quantities by the Gerenuks. Evergreen bushes are not numerous but seen here and there, usually along the dry river beds which are not far between. The Grant Gazelles used to feed on the leaves of these evergreen bushes. Large Euphorbias rise above the thornbush but they are few in number. Flat-topped acacias are fairly numerous in some localities, but they are always more widely scattered than on the acacia steppe. Some of these acacias began to get leaves towards the middle of March, but the shade thrown by them was not very effective, and that of the Euphorbias decidedly better, although the latter always are without leaves. A coarse grass growing in tufts is to be found here and there and sometimes it almost covers the ground on some open places in the thornbush, offering pasture lands for Buffaloes, Grévy's Zebras etc. Although this grass looks very dry and coarse it must be nourishing, because as well the wild grazing animals as the cattle, sheep and goats of the nomadic tribes were in fairly good condition.

Low bushes with wooden stems and branches but more herbaceous tops are common, and the Rhinoceros feeds chiefly on such. At Thera I saw once some kind of such bushes with white flowers.

Along Guaso Nyiri grows a fringe of doupalms, and among them also high poplar-like trees of 2-3 different species, and sometimes also big acacias. Among these trees the Tumbili-monkeys (*Cercopithecus pygerythrus*), live but they are very good runners on the ground and are often met with in the thornbush far from any trees and then know how to save themselves by slipping in among the thick bush. The doupalms are also commonly found along all more important dry river beds. The Elephants eat the palmnuts but are not able to crush them. I often saw that nuts lying on the ground had been gnawed on the exterior somewhat sweetish layer by small rodents (*Acomys*?). It is possible that the Baboons also gnaw on these nuts because my gunbearer Kongoni, who knew a great deal about animals pointed to these nuts once and said 'chakula nyani' ('food of Baboons').

Here and there rocks of granite rise above the level ground, sometimes forming real little mountains. Among such rocks the Hyraxes find their home, and they are often seen basking in the sunshine outside the crevices and cracks into which they flee when any danger threatens. If the rocks are high and steep the Baboons have their stronghold on them.

With the exception of the river Guaso Nyiri, water is very scarce in this country. The numerous river-beds which are directed as affluents to Guaso Nyiri were all of them dry, at least in Febr. and March, when we were there, and probably many of them, if not all, are permanently dry. A few waterholes exist in the bottom of

otherwise dry riverbeds as at Njoro and Thera. As mentioned above the water at the former place is salt. It appeared to me to be of interest even from a biological point of view to know the chemical composition of this salt water of which so many animals drink. Therefore I brought along with me a carefully corked bottle containing a sample of this salt water from Njoro, and when I had come home my friend Count K. A. H. MÖRNER, Professor of Chemistry, kindly undertook the work of analysing this water, and he has prepared the following report for which I wish to express my gratitude.

Analysis of water from Njoro in the Rendile country, British East Africa.

By

K. A. H. MÖRNER.

When Professor EINAR LÖNNBERG returned from his zoological expedition to British East Africa in May this year (1911) he brought with him a sample of water which he had taken from a place called Njoro in the dry thornbush-country north of Guaso Nyiri which is inhabited by the nomadic Rendile tribes. Professor LÖNNBERG informs me that the water originates from one of a series of holes dug by the Rendiles in a dry river-bed. Almost all of these holes contained water but that water was not of the same quality in all, it was more salt in some than in others. It was used by the Rendiles as well for themselves as for their animals. Almost every day many hundreds of sheep and goats were driven down to the river and quenched their thirst with that water which was scooped up and offered to them in dug out logs. About every third day several hundreds of camels were in a similar way watered there. In consequence of the manner in which the watering took place it lasted several hours during which the animals stood densely crowded in the river-bed. The water-holes were also visited during night time by wild animals even elephants and rhinoceroses. Some of the wild beasts preferred, however, a small natural pool at the base of a rock further down the river bed.

Considering the great number of animals which visit these water-holes and the long time some of them remain in the river-bed Professor LÖNNBERG suspected that the water might be polluted by the droppings and the urine of the animals which might be expected to penetrate the loose layers of sand and reach the aquiferous layers. The analysis does not, however, bear out that this suspicion is founded. As will be set forth below there are no nitrates no nitrites of any kind nor ammonia to be found. It appears also, to judge from the analysis, as if the water originated from a natural mineral spring and was not fully stagnant.

The present author received the sample of water the 31st of May 1911, and set to work at once. The quantity of water¹ was only 750 cm³ and the investigation

¹ As everything must be carried from Njoro by native porters and the other collections were large as well as heavy it was connected with difficulty to take more.

could therefore not be carried out in such a manner as is usual at a complete analysis of water.

The water showed a grey-coloured deposited sediment. A microscopical examination of this deposit did not reveal anything worth mentioning. The dried deposit contained organic substance which was burnt; the quantity of organic substance was 8,1 mgm. corresponding to 1,1 pr. 100,000 parts of water. The inorganic part of the sediment weighed 37 mgm. corresponding to 4,9 pr. 100,000 parts of water; it contained iron, lime, and magnesia, together with a small quantity of insoluble remains; arsenic was not found in it.

The water had a rather strong smell of sulphuretted hydrogen,¹ and the fumes blackened a lead acetate-paper. The specific weight of the water was 1,0318. Its reaction on litmus was neutral.

The qualitative analysis proved the presence of calcium, magnesium, sodium, and potassium; further sulphuric acid, chlor. and carbonic acid; trying for boric acid with turmeric paper gave a feeble reaction at a direct investigation of the water, and after concentration of a sample of water boric acid could undoubtedly be stated to be present in such a degree as to be worth mentioning. Nitrates and nitrites were completely absent; even ammonia was absent or only present as a questionable trace. The investigation proved further the absence of lithium, of phosphoric acid and — as far as the investigation could be carried out with such a small quantity of water — of metals with the exception of a trace of iron.

The quantitative determination gave the following results estimated for 100,000 parts of water:

The quantity of anhydrous salts after evaporation with carbonate of soda was 344,7.

The quantity of bases transformed to sulphates and after removing the silicic acid as fluorsilicium amounted to 411,0.

Chlor, as Cl, was	= 1,56
Sulphuric acid, as SO ₃ was	= 22,61
Lime, as CaO, was	= 31,75
Magnesia, as MgO, was	= 27,9

The chlorides of alkalines amounted to 203,9 of which chloride of potassium was = 6,8.

All these values for the bases calculated as sulphates give the following figures:

Ca SO ₄	77,17
Mg SO ₄	83,77
K ₂ SO ₄	7,37
Na ₂ SO ₄	238,80
Total	407,11

¹ This smell was not apparent at the time of the bottling. E. L.

Compared with the quantity of sulphates directly determined (411,9) this sum shows a difference of 3,9 or 0,9 %.

The summing up of the results of the analysis in the usual manner gives the following result for 100,000 parts of water:

KCl	6,3
NaCl	197,6
CaSO ₄	38,4
CaCl ₂	31,5
MgCl ₂	17,4
MgCO ₃	43,3
Organic substance, Silicic acid, boric acid etc.	10,2
Total	344,7

According to the experience of Prof. LÖNNBERG and his companions the use of this water for drinking purposes produced diarrhea which, however, subsided after a few days. In spite of the quantity of salt it contained, this water quenched the thirst perfectly, and when once accustomed to it the members of the expedition liked it very well so that when they again, after some time, had the opportunity of drinking the quite fresh water of the river Guaso Nyiri the latter seemed flat and tasteless.

The scarcity of water in the thornbush country and its general aridity makes it to some extent the equivalent to a desert. When one sees the grey leafless thornbush during the dry season and the apparently barren ground scorched by the merciless rays of the glaring equatorial sun it looks rather unpromising to a biologist. It hardly appears as if such a country could offer the necessities of life to any animals. As soon as one turns away from the river there is hardly anything green to be seen, if not perhaps a fringe of doupalms at a distance which appears to denote a watercourse. But if one hastens there in the hope of finding water one is sadly deceived, the river bed contains nothing but hot and dry sand. In spite of all these apparently unfavourable conditions, which cannot fail to make an, at first, almost saddening impression on the visitor, the thornbush country is not at all so bad as it looks. The naturalist will on the contrary very soon find that it is quite an interesting country. The bird life is rather rich and the number of species is, as can be seen in the report on the birds collected by this expedition, greater than could be expected. The numerous spoor seen in the game paths prove that many big mammals live here as well. Most apparent are the big three-toed tracks of the Rhinoceros, the marks of the broad horse-like hoofs of Grévy's zebra etc. But soon more than spoor are seen. The long necks of the Somali Giraffes tower high above the thornbush and are thus observed even if rather far away. The coarse bark of

the old Baboons and the yell of the young when they are chastised are heard from the thickets and, if some steep rocks are near, the whole troop is soon seen climbing up to a safe distance. The slender necks of the Gerenuks appear as reddish looking streaks against the grey bush when the animals stand gazing at the intruder. Long-eared Somali Hares and pretty little Dikdiks in pairs or threes start now and then out from below the bushes and run away. On more or less open places Grévy's Zebras in small herds, but sometimes single and often in company with splendid Oryxes, have their pasture. Grant Gazelles in small flocks are usually found not very far from the river, and the Waterbucks as a rule live in still closer proximity to it. The usual haunts of the Impalas are among bushes around small ravines not far from water. The herds of Buffaloes select such districts where open places with grass are surrounded by dense thornbush and they have their well beaten tracks from there to the water. The big animals appear to be in need of water every day (or night).¹ In consequence of this they cannot live too far from water, but some species like the Rhinoceros have their feeding grounds at a distance of two or three hours march and perhaps even more from the water and they must thus travel such a distance every night. Buffaloes and Oryxes are also sometimes found more than one or two hours from water. The long legs of the Elephants and Giraffes enable them to cover great distances without difficulty and they can thus feed far from their drinking places. Warthog spoors were seen every day at the waterpools at Njoro and the few specimens observed were seen, partly not far from there, partly not far from Guaso Nyiri. Some of the smaller animals are probably more independent of the pools and the river whether they slake their thirst with the dew, or with the juices contained in the vegetative matter they feed on. I am uncertain whether the Gerenuks ever drink, but it seems quite impossible to think that all Dikdiks, which appear so stationary and which sometimes are found to become more and more common, the further one proceeds from the river, should crowd down to the water to drink and then disperse to their haunts again every night. It would be far too dangerous for their existence to travel so much. The rodents of this country probably do not drink, and the same is no doubt the case with the Hyraxes. The Baboons and the Tumbili monkeys are seldom seen far from the water and the former come down very regularly to drink. The spoors of the carnivores, Lion, Leopard, Striped Hyena and the Black-backed Jackal as well as the animals themselves were mostly seen near the water. The Genet (*Genetta dongolana*) and the Mongoose (*Mungos sanguineus rendilis*) were trapped near the river, but *Helogale* which often lives among the colonies of Ground Squirrels was almost always shot at a comparatively considerable distance from it.

The small mammals are comparatively less numerous than the big and medium sized. There is no tree squirrel in the thornbush, and the only climbing mammal except the monkeys mentioned above is the small *Galago gallarum*. Two species of bats were observed, the yellow-winged *Lavia*, and the small *Nycteris hispida*. Of in-

¹ I am uncertain, however, whether the Elephants as mentioned below need to drink oftener than every second night.

sectivores a Hedgehog appeared to be common to judge from the numerous skins scattered in the thornbush, and an Elephant Shrew was now and then seen tripping through the bushes. Three species of *Acomys* were comparatively numerous but otherwise no small rodents were observed except the peculiar Naked Rat (*Heterocephalus*) which had its burrows in places where the soil consisted of sand. In the hard packed gravel it probably would not be able to work its way.

Although Guaso Nyiri is pretty well stocked with fish I did not see any signs of Otters along its banks. The only water mammal there was the *Hippopotamus*.

In the following list the names of the mammals observed in the thornbush country north of Guaso Nyiri are enumerated. It may be seen from the same that strange enough there are two Baboons, two Hyraxes and two Dikdiks and of these one subspecies lives above and the other below Chanler Falls. This appears to indicate two small zoogeographical areas meeting there.

Distribution of the genus or subgenus	Distribution of the species and closely allied forms	Thornbush mammals	Above Chanler Falls	Njoro and below Chanler Falls
A.	E.	<i>Cercopithecus pygerythrus luteus</i> ELLIOT . . . . .	.	+
"	E(no).	<i>Papio anubis juraz</i> ELLIOT	+	.
"	Eno.	" <i>doguera</i> PUCH. & SCHIMP. . . . .	.	+
"	S.	<i>Galago gallarum</i> THOMAS . . . . .	.	+
At.	"	<i>Lavia frons affinis</i> ANDERSEN & WROUGHTON . . . . .	.	+
A.	A.	<i>Nycteris lasipida</i> (SCHREBER) . . . . .	.	+
Ea.	E(no).	<i>Erinaceus hindei</i> THOMAS	+	+
"	S(E).	<i>Elephantulus pulcher rendilis</i> LÖNNBERG	+	+
A.	Ea.	<i>Canis mesomelas</i> SCHREBER	+	+
Ea.	S(e).	<i>Hyena schillingsi rendilis</i> LÖNNBERG	+	+
A.	Sno.	<i>Genetta dongolana</i> HEMPR. & EHRENBG . . . . .	.	+
"	S(Ea).	<i>Mungos sanguineus rendilis</i> LÖNNBERG . . . . .	.	+
"	S.	<i>Helogale hirtula ahlacelli</i> LÖNNBERG . . . . .	.	+
"	"	<i>Felis leo somaliensis</i> NOACK	+	+
"	A.	" <i>pardus</i> LIN.	+	+
Eno.	S.	<i>Xerus rutilus dabagala</i> (HEUGLIN)	+	+
A.	"	<i>Acomys percivali</i> DOLLMAN . . . . .	.	+
"	"	" <i>kempii</i> "	+	+
"	"	" <i>pulchellus</i> " . . . . .	.	+
S.	"	<i>Heterocephalus glaber progrediens</i> LÖNNBERG	+	+
A.	S(E).	<i>Hystrix galata somalensis</i> LÖNNBERG	+	+
Ea.	S.	<i>Lepus somalensis</i> HEUGLIN	+	+
A.	"	<i>Procavia brucei borana</i> LÖNNBERG	+	.
"	"	" <i>rudolfi pumila</i> THOMAS . . . . .	.	+
"	"	<i>Elephas africanus cavendishi</i> (LYDEKKER) . . . . .	.	+
Ea.	Ea.	<i>Rhinoceros (Diceros) bicornis</i> LIN.	+	+
"	E(s).	<i>Equus burchelli bohmi</i> MATSCHIE (v. <i>granti</i> D. W.)	(+)	.
"	S.	" <i>grevyi</i> OUSTALET (<i>faurci</i> MATSCHIE?) . . . . .	.	+
A.	"	<i>Phacocharrus delamerei</i> LÖNNBERG	+	+

Distribution of the genus or subgenus	Distribution of the species and closely allied forms	Thornbush mammals	Above Chanler Falls	Njoro and below Chanler Falls
A.	A.	<i>Hippopotamus amphibius</i> LIN.	•	+
	S.	<i>Giraffa camelopardalis reticulata</i> DE WINTON	+	+
Ea.	»	<i>Rhynchotragus cavendishi minor</i> LÖNNBERG	•	+
»	»	» <i>guentheri wroughtoni</i> DRAKE-BROCKMAN	+	•
A.	(E(S).	<i>Kokus ellipsiprymnus canescens</i> LÖNNBERG	+	+
Es.	»	<i>Epyceros melampus rendilis</i> LÖNNBERG	+	+
Ea.	S(E).	<i>Gazella granti lacuum</i> NEUMANN	+	+
S.	Se.	<i>Lithocranius walleri</i> BROOKE	+	+
Ea.	S.	<i>Oryx beisa annectens</i> HOLLISTER	+	+
»	E.	<i>Taurotragus oryx pattersonianus</i> LYDEKKER	+	+
A.	E(s).	<i>Buffelus caffer radcliffi</i> THOMAS	+	+

The forests of British East Africa in which I had the opportunity of studying the fauna some little time are those near Nairobi and Escarpment station, the primeval forest on the eastern slopes of Kenia, and the woods near Meru boma. These exhibit several different types, although these intergrade with each other. The forests near Nairobi are more or less xerophilous with comparatively small leaves and a thin foliage which admits the light to penetrate. The result of this is that a very thick undergrowth of bushes and liane is produced, and in the darkness of this several animals find suitable covert. Among these are the Bushbuck, the »Suni» (*Nesotragus moschatus*) and the Red Forest Duiker, not to mention the Bushpigs. The small greenish looking Scrub Squirrel (*Paraxerus jacksoni*) skulks also among this undergrowth. The only monkey in the Nairobi forests is the »Kima» (*Cercopithecus kolbi*).

The forest at Escarpment is different. It contains (or contained) in some places numerous cedars, Podocarpus etc. In other places different kinds of trees, some with large leaves grow at such a distance from each other that a very dense undergrowth of bushes and very tall (2-3 m.) plants can develop and cover the ground. The Kima-monkey was common there, but a White-tailed Guereza (*Colobus abyssinicus kikuyuensis*) inhabits also the forest chiefly on the top of the mountain plateau. A new *Galago* of the *Otolomur* group was also secured at this place, and its screams could be heard almost every night from the crowns of the trees. Still more noisy and very numerous are the Tree Hyraxes (*Procavia crawshayi*). Of small rodents *Lophuromys aquilus*, *Arvicanthus pumilio diminutus* and *Dendromys insignis* were trapped in bush, and the Scrub Squirrel (*Paraxerus jacksoni*) was found to be common. I did not see any larger Squirrel in this forest but Mr. WOOSAM showed me once two skins which were from the Escarpment and looked like melanistic specimens of *Helioseiurus kenia* without any white on the foreneck. A *Cephalophus* was seen a couple of times in bush at the edge of the forest, but as I did not have any opportunity of shooting it, I could not ascertain to which species it belonged. Bushbucks were common, and a Kikuyu told me that they used to feed on some plants of the family

Labiata which grew in quantities in open places in the forest. The bush at the edge of the forest was also a refuge for the Baboons which ravaged among the crops of the natives.

The primeval forest on the slopes of Kenia exhibits many different types of vegetation. In the lower forest region the foliage of the big trees form a dense roof which does not admit the light, and there is consequently no undergrowth except in certain places where an opening has been made by the fall of some of the old giants. There a number of young saplings struggle towards the light. Otherwise this forest with its sombre twilight gives the impression of a mighty cathedral with numerous columns. Along the ravines, at the bottom of which a rivulet seeks its way down the mountain, the vegetation is more compact, so to say, entangled with lianæ interwoven in the bushes and among the trees. In such localities grow tree-like ferns, *Musa*, and other luxuriant members of the tropical forest vegetation. At a greater altitude the trees often stand further apart and a dense undergrowth of bushes, sprouts of *Abutilon*-like appearance, tall (2-3½ m. or more) herbs etc. is formed. In other places again, probably on more dry ground, the plants are low not reaching much above the knee of a walking man. *Labiata* are especially common but even grass grows here. In a peculiar formation of forest the trees have not straight trunks as usual, but look more like gigantic overgrown bushes with the stems irregularly crooked and branched. In the upper forest region¹ clumps of bamboo mix with the trees and become finally dominant. The lower forestregion does not appear to be rich in mammals. The Tree Hyraxes are of course numerous here as well as at higher altitude. *Cricetomys* and *Genetta stuhlmanni* were trapped here. Leopards were said to be common in the lower forest region. They had snatched away three dogs in a few weeks from an Englishman who was collecting rubber there, but we did not see any signs of them. The Kima monkey and the Elephant are found from the lower forest to the bamboos. The Guerezas, which were seen when we passed through the forest, were observed at an altitude of about 2,500 m. or a little more. The trees were here often festooned with *Usnea* lichens. The little Suni Antelope (*Nesotragus*) extends to a height of 2,700 m. The Bushbuck and Bushpig appear to be common there as well, and the regular home of the Bongo and the Black Forest Hog is in the region where forest and bamboo mix, to judge from the numerous spoors and droppings seen there. The Wandorobbos² have most of their pitfalls dug in the upper forest region. They are of varying size according to the size of the animal for which they are intended, from Elephant to Bushbuck. They are rectangular in shape and very deep but narrow. The scheme appears to be that the animal shall fall down entirely or with the forequarters and be squeezed in between the walls so that it cannot get up again, especially as it does not reach the bottom of the pit with its feet.

¹ On open places at an altitude of 2,500—2,700 a number of plants grow which belong to wellknown European genera as *Alchemilla*, *Pinguicula*, *Trifolium*, *Thalictrum*, *Rubus*, *Carex*, *Lycopodium* etc.

² The dwellings of the Wandorobbos were seen here as well. In some places they inhabited big hollow trees to the interior of which they had made an entrance hole by burning. A bed of dry leaves and firewood was found inside. In one place they lived under a big fallen tree and had put some branches in front for protection. Remains after their quite small camp fires were very common.

Small mammals as well are perhaps more common in the upper forest region than in the lower. In the latter *Heliosciurus kenia* was shot and *Epimys jacksoni* trapped; at higher altitudes, *Otomys irroratus elgonis*, *Epimys denniae*, *Leggadina triton* and *Lophuromys* but the two latter occur also outside the forests in the cultivated region. The Shrews (*Crocidura fumosa* and *turba*) were found as well in the forest as outside the same.

On our return march through the forest we found numerous tracks of Buffaloes at an altitude of about 2,400 m. in a tract with many open places between the trees, clumps of bamboo and thickets of bushes. The ground was there mostly covered with plants belonging to *Labiata*, and *Cyperus*. It made a strange impression to find Buffaloes and Elephants here in the evergreen forest when we recently had met with them in the dry grey thornbush. Evidently the forest must suit at least the Elephants better, but the occurrence of both in localities so widely different with regard to the natural conditions prove the great faculty of adaptation in these animals. In the thornbush country, where hardly any shade was to be found, the usual temperature during our stay there in Febr. and March was $+33^{\circ}$ to $+38^{\circ}$ C. under the dounpalms and of course very much more out in the open thornbush where there was no protection against the scorching sun. In the upper forest region $+8^{\circ}$ C. was observed one morning in March so late as 8 o'clock, and the same temperature at sundown another day. At an altitude of 2,700 m. it was only $+1^{\circ}$ C. at sunrise, but fresh tracks of Elephants were seen near our camp. Bushbuck, Bongo, Bushpig, Black Forest Hog, Kima monkeys and many other tropical animals do well in such a temperature.

The woods near Meru boma, although not so extensive, resemble those on Kenia. There is represented as well the forest with very tall trees with or without an undergrowth of bushes and plants, as the peculiar type of forest in which the trees resemble gigantic overgrown bushes. The latter forest is situated an hour to the north of Meru boma. Typical mammals of the forest at Meru are the Kima (*Cercopithecus kolbi*), the Forest Squirrel (*Heliosciurus kenia*) the Meru Scrub Squirrel (*Paraxerus jacksoni kahari*) Bushpigs, Bushbucks, Suni Antelopes and Red Forest Duiker. The dark Mongoose (*Mungos sanguineus orestes*) was also found there.

The following list gives the names of the mammals observed or collected during my short visit in the forests mentioned above.

Distribution of the genus or subgenus	Distribution of species and closely allied forms.	Forests-mammals	Nairobi xerophile forests	Escarpment	Kenia	Meru
At.	E.	<i>Colobus abyssinicus kikuyuensis</i> LÖNNBERG . . . . .	.	+	(+)	.
	"	<i>Cercopithecus kolbi</i> NEUMANN	+	+	+	+
A	At.	<i>Papio anubis</i> subsp.	(+)	(+)	.	.
E.	E.	<i>Galago (Otolemur) kikuyuensis</i> LÖNNBERG . . . . .	.	+	.	.
A	E Wc	<i>Crocidura fumosa</i> THOMAS . . . . .	.	.	+	.
"	Eni.	" <i>turba</i> DOLLMAN . . . . .	.	.	+	.
	E Wc	<i>Genetta stuhlmanni</i> MATSCHIE . . . . .	.	.	+	.

Distribution of genus or subgenus	Distribution of species and closely allied forms.	Forests mammals	Nairobi xerophile forests	Escarpment	Kenia	Meru
A	E (Wc)	<i>Mungos sanguineus orestes</i> HELLER . . . . .	.	.	.	+
"	A	<i>Felis pardus</i> LIN. . . . .	.	.	+	.
At.	E	<i>Heliosciurus kenie</i> NEUMANN . . . . .	.	(+)	+	+
A	"	<i>Paraxerus jacksoni</i> DE WINTON (<i>capitis</i> THOS.) . . .	+	+	.	.
"	"	" " <i>kahari</i> (HELLER) . . . . .	.	.	.	+
Ea Wc	E Wc	<i>Otomys irroratus elgonis</i> WROUGHTON . . . . .	.	.	+	.
A	"	<i>Dendromys insignis</i> THOMAS . . . . .	.	+	.	.
"	"	<i>Epimys jacksoni</i> DE WINTON . . . . .	.	.	+	.
"	"	" <i>dennie</i> THOMAS . . . . .	.	.	+	.
"	"	<i>Leggada trilon</i> THOMAS . . . . .	.	.	+	.
At.	E. (At)	<i>Cricetomys gambianus kenyensis</i> OSGOOD . . . . .	.	.	+	.
"	E Wc	<i>Lophuromys aquilus zena</i> (DOLLMAN) . . . . .	.	+	+	.
A	E Wc (At)	<i>Arvicanthus pulchellus massaicus</i> (PAGENST.) . . . .	.	.	+	.
"	Es	" <i>pumilio diminutus</i> THOMAS . . . . .	.	+	.	.
Eno	E.	<i>Lophiomys ibeatus</i> THOMAS . . . . .	.	Man	.	.
A	"	<i>Procavia (Dendrohyrax) craveshayi</i> THOMAS . . . . .	.	+	(+)	.
"	E (u)	<i>Elephas africanus peeli</i> LYDEKKER) . . . . .	.	.	(+)	.
"	"	<i>Potamocheirus chacropotamus kenie</i> LÖNNBERG	+	.	(+)	(+)
WE	E (W)	<i>Hylocharus meinertzhageni</i> THOMAS . . . . .	.	.	+	.
A	E.	<i>Cephalophus harveyi</i> kenie LÖNNBERG	+	.	+	+
"	—	<i>Cephalophus</i> sp. . . . .	.	(+)	.	.
Es	E (s)	<i>Nesotragus moschatus</i> v. DÜBEN	+	.	+	+
A	E	<i>Tragelaphus haywoodi</i> THOMAS	+	+	+	.
W (At)	E (W)	<i>Boocercus eurycerus isaaci</i> THOMAS . . . . .	.	(+)	+	.
A	E (s)	<i>Buffelus caffer radcliffei</i> THOMAS . . . . .	.	.	(+)	.

A short discussion of the geographical distribution of these animals collected or observed by this expedition in British East Africa may not be out of the way. Before this is begun, however, a few words ought to be said about some of the principal zoogeographical systems applied to the African continent. The perhaps best known is that of WALLACE¹ from the year 1876. He proposed »three great continental subregions» cutting off from the Ethiopian region the land to the north of Sahara,² which was laid to the Palearctic region. These three subregions were: 1:o the East African, which principally included »the open pasture lands of interior tropical Africa» — — — — — with a hot and dry climate and characterised by a grassy vegetation interspersed with patches of forest; 2:o the West African »being almost wholly dense forests where not cleared by man, and having the hot moist

¹ Geographical Distribution of Animals. Vol. I p. 251.

² This proceeding is of course artificial and arbitrary. As far as the mammals are concerned at least, North Africa is (or has been) a border-land which has received contingencies as well from the Palearctic as from Ethiopian regions and its fauna is mixed containing still elements from both, but probably the Ethiopian elements formerly have been more numerous than they are in the present time.

³ Or »all the open country of tropical Africa south of Sahara» — — (l. c. p. 258).

uniform climate, and perennial luxuriance of vegetation — -- —; 3:o the South African to which belonged the «extra-tropical» southern portion of the continent. The boundary-lines need not to be quoted, they have of course had to be altered, because at the time when WALLACE wrote this the knowledge of the interior of Africa was, as he points out himself, imperfect.

The chief interest with this division is that WALLACE on the base of as well physical as biological conditions forms the East- and West African subregions, the «extra-tropical» has subsequently proved less important. HEILPRIN divided¹ also «the Ethiopian Realm» in three subregions which he named the «East-Central African», the «West African» and the «Saharan». The first of these included also South Africa, and the last, the northern desert country, the fauna of which «with almost insensible gradations, merges into the fauna of the Mediterranean transition tract».

LYDEKKER prefers HEILPRIN's subdivision but adds that Somaliland probably ought to be regarded as a separate subregion.

In a book entitled «The Geography of Mammals» W. L. and P. L. SCLATER in the year 1899 used a zoogeographical subdivision of the Ethiopian continent which is intermediate between WALLACE's and HEILPRIN's systems. They have 1:o «the West African subregion, including the great equatorial forest of Central Africa contained in the basins of the western rivers, from the Senegal to the Congo inclusive»; 2:o «the Cape subregion including all Africa south of the watershed of the Congo on the West and of the Tana on the East coast»; 3:o «the Saharan subregion, consisting (if we exclude the Abyssinian plateau) chiefly of desert, or at any rate of a comparatively dry country, including the Sahara, Eastern Africa as far south as the Tana river, and Southern Arabia.»

In this division as well due regard is taken to the physical and biological conditions of the three subregions. The characteristic features of the landscape of these subregions are just those three original types of African landscape which have been mentioned above viz. forest, steppe, and thornbush resp. desert.

It appears also evident that certain faunistic elements are more or less strictly bound to one or the other of these types of landscape. But not all mammals by far are so dependent on the environment. Many strong or adaptive mammals may occur in two, and some even in all three of these kinds of landscape. Steppe and thornbush are, however, more alike than either with the forest, and the faunas of the two former have therefore a greater number of elements in common than either of them have with the forest.

The three geographical subregions as defined by the Messrs. SCLATER are, however, not homogenous. There are forests outside the «West African subregion», there is open country outside the «Cape Subregion», and so on. These outlying portions of landscape, otherwise typical to another zoogeographical subregion, must, however, be taken in possession by some kind of animals to which they offer suitable conditions of life (whether this primarily or secondarily is the case). Now it depends

¹ The Geographical and geological Distribution of Animals. Eded. 1894.

² Die geograph. Verbreitung u. geolog. Entwicklung der Säugetiere 1897.

upon the situation of this outlying portion of landscape if it is, or has been accessible to animals from the subregion where this kind of landscape is the dominating type or not. In the former case the faunistic elements of the proper kind wander in (or have done so), in the latter it remains uninhabited until some animals from the surrounding country have been able to adapt themselves to the life in such a landscape. For instance there are tracts of forest in East Africa within SELATER's «Cape subregion», which offer as well from a physical as a biological point of view similar conditions of life to mammals as a corresponding portion of forest in the West African genuine forest subregion. If such a forest in East Africa has been accessible to some West African forest mammals these have, of course, extended their distribution to that district, notwithstanding that it lies outside the regular and continuous area of distribution for West African forest mammals. Some of the latter have also been able to reach further and to occupy more isolated spots than other less endowed species.¹ Many examples of such a distribution have become known during these last years, and some of them will be mentioned later on.

If on the contrary a tract of forest in East Africa is and has been so completely isolated from the West African forest region that no inhabitants of the latter can or could reach the former its fauna must be recruited by members of the surrounding real East African fauna which then had to adapt themselves to live in this forest. Thus a true East African forest fauna can originate.

It is also evident that some East African forests have such a situation that their fauna is partly of West African origin, partly endemic. As will be shown further below the forests of Kenia form such a district with a mixed fauna and even Kilimanjaro has certain western elements.

The knowledge about the African fauna has made great progress during the last 10—15 years. The relation between the fauna of the West African subregion and that of the other subregions has therefore in many respects been found to be different and the boundarylines of several genera and species have been drawn up quite differently to what was known and done at the time when «the Geography of Mammals» was written. As an instance of this the following mammals may be mentioned. They were at that time believed to be exclusively West African but have later been found outside this subregion. A Potto (*Perodicticus ibiculus*) has been described by THOMAS from Kakamega Forest near Elgon, British East Africa. The genus *Nandinia* reaches even Kilimanjaro, Uhehe, Nyasa etc.

On the other hand it was also stated in the work quoted that «the West African Region is further characterized by the absence of the following families, well represented in other parts of Africa: *Orycteropidae* (Aard-vark), *Giraffidae* (Giraffes)» — — — Since that time have, however, been described *Orycteropus hausanus* from Togo, *D. erikssoni* from Kongo, and *O. leptodon* from Cameroon; and further *Giraffa camelopardalis piralla* from Nigeria and *G. c. congoensis* from Katanga, Kongo. By this are of course not the differences between the West African forest subregion

¹ About another possible explanation for the occurrence of certain forest mammals in East Africa conf. below.

and the others abolished, but the facts mentioned form another of the numerous proofs that many members of the typical fauna of a subregion extend into other subregions as well, if suitable conditions of life in accessible districts are offered to them. On this depends the distribution.

Since «the Geography of Mammals» appeared also several important discoveries of new mammals characteristic of the West African forest region have been made.¹ The one which created most interest was probably the Okapi, but it is also striking that the first specimen of a new genus *Hylochoerus* which evidently is a typical forest mammal was obtained at Mau, British East Africa, outside of the West African forest region, although later on it was proved that members of this genus live in the Kongo forest, in Cameroon and so on.

Before an investigation is made whether any West African mammals have been obtained by this expedition in British East Africa the discussion about the two other subregions of SCLATER's system ought to be continued. The «Cape Subregion» as defined above includes WALLACE's South African and the southern half of his East African subregion. It was undoubtedly a step in the right direction to unite these two subregions as they have proved to be more similar with regard to their faunas than was known when WALLACE wrote his book on geographical distribution, but it is more uncertain whether the limitation towards the north of SCLATER's «Cape subregion» is successfully chosen. The name is certainly not very characteristic. It is true that «Cape» or South Africa has a certain number of endemic mammalian genera as for instance *Cynictis*, *Suricata*, *Petromys*, *Bathyergus*, *Pelea* etc. and probably is *Chrysochloris* still more typical for South Africa, although some of its species reach much further north. There are also some endemic species like *Hyana brunnea*, *Equus zebra* a. o. but they have near relatives further north. Very little of the fauna belonging to SCLATER's «Cape Subregion» can be supposed to have its origin in South Africa, or even to be especially characteristic for that country. Not a few of the genera enumerated by SCLATER as typical for this «subregion» extend according to what we know now beyond its proposed northern boundaryline for instance *Epyceros*, *Pachyuromys*, *Myoscalops*, *Proteles*, *Otocyon*, *Rhynchocyon* and *Myosorex*.

The «Saharan Subregion» according to SCLATER's definition appears to be artificial. Its easternmost portion, Somaliland with its borderlands form a zoogeographical centre of its own with several endemic mammals, for instance not less than three genera of antelopes, *Ammodorcas*, *Lithocranius* and *Dorcatragus* to which might be added *Strepsiceros imberbis*, further the rodents *Heterocephalus*, *Fornarina* and *Pectinator*. In Somaliland is the centre for the genus *Rhynchotragus* as well. There live also the aberrant Grévy's Zebra and the Somali Ass in addition to several other endemic species of genera with a wider distribution. But these characteristic members of the Somali fauna do not extend their distribution westwards through Sudan

¹ But at that time 1899, there were already several typical West African mammals known which are not mentioned, as f. i. *Idiurus*, *Zenkerella*, *Linacomys* etc., and in addition to these genera a very great number of species.

and Sahara where the animal life is different, and in some respects more similar to that of East Africa, at the same time as endemic forms are to be found there.

The Somali district is, however, as fully entitled to be regarded as an independent zoogeographical district as South Africa, but both show great affinities with East Africa.

It appears therefore better to accept also for the mammals the same system for the zoogeographical subdivision of the Ethiopian continent as REICHENOW has used for the birds in his great work *die Vögel Afrikas*.¹ The author quoted divides Africa in a Western forest region and an Eastern Southern steppe region. This system is, of course, in the same way as its forerunners based on the biological conditions which are the results of the topographical, meteorological and climatological factors which have made the forest dominating in one, steppe (and thornbush) in another part of the continent. These two main regions are afterwards subdivided in a number of smaller zoogeographical provinces and these constitute, so to say, smaller zoogeographical centres, or in some cases transition tracts with a mixed fauna. There is evidently no sharp boundary lines between these minor provinces, some of which will be mentioned below, and not even always or in every respect between the main regions. This can the less be the case as the types of landscape and the upon the same depending biological conditions are not completely uniform. There are thus to be found broad open tracts of land within the forest region, and patches of forest scattered in the steppe region with the consequences with regard to the fauna which have been set forth above.

It must also in this connection be remembered that the occurrence of the different species of mammals in different localities of Africa in the present time is not only the result of the present possibilities for distribution to this or that locality, but it is in many cases depending upon the possibility to survive which the locality in question has been able to offer certain animals. Paleontological facts indicate that the ancestors of a great number of the present Ethiopian mammals have invaded the continent from the northeast and east during the Miocene and Pliocene. It is also wellknown that several mammals which now inhabit Western Africa have their nearest relatives in the Oriental region. For instance:

<i>Perodicticus</i>	<i>Nycticebus</i>
<i>Poiana</i>	<i>Linsanga</i>
<i>Nandinia</i>	<i>Paradoxurus</i>
<i>Dorcatheirium</i> etc.	<i>Tragulus</i> etc.

The ancestors of the, in present time, West African mammals which invaded the continent from the northeast must thus evidently have passed through the country which is termed East Africa nowadays, and for some time lived there. If such mammals still should be represented in East Africa, these representatives may perhaps

¹ Berlin 1900—1901.

in some instances be the remnants of such an invasion which have been able to survive in suitable localities. In other cases they may have come secondarily from the west. Considering the great desiccation which large tracts of Africa have been subjected to within the historic time or even up to the present time, — one need only to think about the gradual disappearance of Lake Ngami and the diminution of Lake Tsad — it appears quite possible, or even probable that East Africa formerly has not suffered so much from drought as it does now. But if the climate has been somewhat more moist and the annual rainfall greater, the forests certainly would have extended and covered a greater area. This would have again, in a high degree, facilitated as well the survival of forest animals as even their distribution over a wider area than now.

The minor subdivisions of the Western forest region according to REICHENOW do not need to be repeated all here. It is sufficient for our purpose to mention the most eastern of them which may be called the Central Lake district. It extends over the countries round Albert Nyanza, Albert Edward Nyanza, and Lake Kiwu, the districts round Victoria Nyanza with the exception of its southern and south-eastern shores, and finally the countries bordering the northern part of Lake Tanganyika.

Among the provinces of the Eastern Southern steppe region may be mentioned the «Northeastern» extending southward to Shoa and westward to Lake Tsad; the «Somali-Witu» district southwards to Tana river; «German East Africa» southwards to Rufiji; thence come the «Nyasa» «Zambese» and «South African» districts, etc.

To indicate the distribution of the animals collected or observed by this expedition the following letters have been used above.

- A = ranging all over the Ethiopian region.
- At = widely distributed across tropical Africa.
- E = East Africa s. str. that is German East Africa and the southern parts of British East Africa.
- Ea = all over, or at least over the greater part of the Eastern Southern steppe region.
- Eni = East Africa southwards to Nyasa land.
- Ez = East Africa southwards to Zambesi district.
- Es = East Africa to South Africa.
- Eno = East Africa and northwards beyond Somaliland.
- S = Somali district southwards to Tana.
- Se = Somalidistrict southwards to Kilimanjaro.
- Sno = Somalidistrict and northwards.
- W = West African forest region.
- We = Central Lake district of Western forest region.

These letters are used in two different columns to express partly the distribution of the species with subspecies or closely allied forms, and partly that of the genus or subgenus. It is clear that such an attempt to denote the geographical distribution of some animals with some letters must be only approximate partly because the distribution of the animals is irregular and partly because our knowledge in this matter still is very incomplete. I think, however, that this method in spite of its deficiency may facilitate a general survey of the matter.

In the first table (p. 7) those 33 mammals are enumerated which have been found in cultivated land. These are of comparatively little interest from a zoogeographical point of view. The greatest number of them is East African, at least as subspecies. Some few are widely distributed. But there are also some which extend into the Central Lake district of the Western forest region, viz. *Crocidura fumosa*, *Genetta stuhlmanni*, *Dendromys insignis*, *Leggada triton* and *Lophuromys aquilus*. All of these are, however, really to be regarded as more or less forest animals and they have also been obtained by this expedition in the forests as well (conf. table p. 20, 21). They have, however, remained and found suitable conditions of life even since the natives have cleared away the forest to give place for their shambas. In the Kikuyu and Meru countries the shambas as a rule are made, or have been made, on forest land, even if they in the present time sometimes are rather far from the forest. *Arvicanthus pulchellus massaicus* which mostly lives among bush is not a forest loving animal but extends westwards to Ruwenzori and perhaps beyond. The genera of these mammals have almost all a wide distribution only one (*Zelotomys*) is endemic and one (*Tachyoryctes*) chiefly northeastern.

On steppe land about 54 different mammals have been observed or collected (conf. the table p. 10, 11). The exact number cannot be stated because in some instances it could not be ascertained to which subspecies an observed animal belonged. Some of these have been observed as well on the Athi plains as on the northern acacia-steppe south of Guaso Nyiri but as the time which could be spent at both localities was very short the list of small mammals especially is not complete. It might, however, be expected that the most common and characteristic mammals are included. *Epomophorus wahlbergi* is probably not to be regarded as a steppe mammal, although it was found hanging in bushes on the acacia steppe at Luazomela but a forest of tall acacias and other trees was not far off. On the other hand probably some of the small mammals from the list of those observed in the cultivated region could have been added. The greatest number or about 32 of these species or subspecies belong to East Africa in a stricter sense, but 3 of them have near relatives in the whole or the greater part of the Eastern Southern steppe region. Four have near relatives ranging to South Africa. The Buffalo for instance is very closely related to the typical Cape Buffalo, *Saccostomus mearnsi* is related to *S. masoni*, *Pedetes surdaster* to *P. cafer*, and the Zebra to the southern zebras of the *burchelli* group. Two others have their near relatives not further south than in the Nyasa district (*Otomys angoniensis classodon* and *Sylvioorex sorelloides*). Three have their relatives further northeast being subspecies of Abyssinian mammals (*Tachyoryctes splendens*

ibotanus, *Arvicanthus abyssinicus nairoba* and *Cephalophus abyssinicus hindei*). Three have been marked E(S) because they themselves live on the verge of the Somali district but have their relatives in East Africa. Seven species can be counted to the Somali fauna and they are all from the Guaso Nyiri district. Four carnivores and the Rhinoceros are practically distributed over the whole Eastern Southern steppe region even if the last does not extend to the northwestern parts of that region. *Canis adustus* goes as well west as south but not further north. *Lavia* and the Baboons of the *anubis*-group range across tropical Africa.

The genera have mostly a wide range. One northeastern genus *Xerus*, and a Somali genus, *Lithocranius*, live in the Guaso Nyiri district and one genus from the Athi plains, *Zelotomys*, is endemic, while *Tachygorytes* may be termed northeastern.

As a general result of this discussion can be said that the fauna of the Athi plains is typically East African s. str., but that some members of the Somalifauna cross to the acaciasteppe on the southern side of Guaso Nyiri.

The list of the thornbush mammals (conf. the table p. 17, 18) from the northern side of Guaso Nyiri comprises about 40 species. Among these 3 viz. *Nycteris hispida*, the Leopard and Hippopotamus are found in the whole Ethiopian region and 2 viz. the Blackbacked Jackal and the Rhinoceros in the whole Eastern Southern steppe region except the northwest. Grants Zebra with southern affinities is only a rare guest on the northern bank of Guaso Nyiri in this part of the country. The Buffalo as well probably does not extend further north. The Waterbuck and the Impala are represented by separate geographic races here near their northern boundary line and they do not reach the genuine Somaliland. The Tumbili monkey and Pattersons Eland may be regarded as East African near their northern frontier as well. *Papio anubis furax* being described from the Baringo district, and *Erinaceus hindei* from the central parts of British East Africa may be counted to the East African fauna but they have their nearest relatives further north resp. *Papio a. doguera* and *Erinaceus albiventris*. The remaining lot, or about 26 species, may be counted to the Somali fauna, even if the Elephant Shrew, the Striped Hyena and the Porcupine only are subspecies of East African species, and some like the Gerenuk extend southwards a little further than the others. Several of the mammals found here form separate subspecies of the species found in northern or central Someliland, but on the whole the fauna can be said to be a real Somali fauna. Even if it is to some degree modified and has representatives of its own it is quite of Somali type.

The genera have mostly a wide range but *Xerus* is northeastern, and *Lithocranius* and *Heterocephalus* are characteristic of the Somali district.

The mammals (conf. table p. 20, 21) obtained or observed by this expedition in the forests at the four different localities mentioned are not very numerous as they only amount to 32. Of these the Baboon is not a real forest animal, although it takes its refuge to the forest and thus was observed there. The Leopard has a very wide range. *Arvicanthus pumilio diminutus* extends southwards to Matabele land, and *Crocidura turba* to Nyasa land. The Bongo and the Black Forest Hog evidently represent animals which typically belong to the Western forest region. Even if they

can be distinguished from their near allies living in the Congo forest and further West, they must be regarded as members of the same fauna, and it is therefore of great interest to have stated their occurrence as far as to the northeastern slopes of Kenia. Their ancestors have arrived in Africa from the northeast, but if they themselves have developed and remained in their present habitat while the other members of the same invasion were pressed further westward, or if they secondarily have arrived there again from the West cannot be decided before the geological development and age of the former volcano Kenia has become definitely known.

Not less than nine of these forest animals enumerated in this list have also been found in the Central Lake district of the Western forest region, and a tenth, *Mungos sanguineus orestes*, is said by its describer to be most nearly related to a subspecies *M. s. proteus* living on Ruwenzori. The two long-tailed forest rats, *Epiomys jacksoni* and *E. dennie*, have decidedly western affinities as they are most closely related to the West African *E. alleni* and to *E. carillus* from northern Angola thus both members of the fauna of the Western forest region. In a similar way *Leggula triton* is allied with the Western *L. musculoides*.

The remainder of the lot is at least in their quality as subspecies East African s. str. Although this proves that the majority of these forest animals have become differentiated to subspecies, or even species in East Africa s. str., it does not follow that they all are exclusively of East African origin. Some of them have relatives in other parts of Africa as well. The genera to which these endemic forms belong have mostly a wide distribution. Some of them range all over the Ethiopian region. *Lophiomys* extends from East Africa s. str. chiefly northeastwards, and *Nesotragus* southwards but the latter is also related to the genera *Hylarnus* and *Nesotragus* of West Africa. *Colobus*, *Heliosciurus*, *Cricetomys* and *Lophuromys* are represented as well to the east as to the west of the Kenia district, but do not reach to South Africa. The occurrence of their members is thus chiefly bound to the tropical forests of Africa. In any case, whether the members of these latter genera are regarded as western or not, the fauna of Kenia shows a decided affinity with the fauna of the Western forest-region.

Kenia and Kilimanjaro present certain analogies in many respects. Both of them are old extinguished volcanoes which rise from the hot plains at their feet to such a height that their tops are capped with perpetual snow, while their slopes are covered with the luxuriant growth of the tropical forest. It is thus only natural that their faunas shall offer several analogies as well. The number of identical species is not so great. They have been isolated too long for that, but in such cases when the species are not identical there are others present as substitutes and fill the place that otherwise would have been empty. The following list is meant to give a review of this even if additions might be made.

	Kenia district	Kilimanjaro
White-tailed Guereza	<i>Colobus abyssinicus kikuyuensis</i>	<i>C. a. caudatus</i>
"Kina" Monkey	<i>Cercopithecus kolbi</i>	<i>C. albigularis kibonotensis</i>
"Komba" Lemur	<i>Galago (Otolemur) kikuyuensis</i>	<i>G. (O.) panganiensis</i>
Dusky Shrew	<i>Crocodyria fumosa & turba</i>	<i>C. fumosa & monax</i>
Forest Squirrel	<i>Heliosciurus kenie</i>	<i>H. undulatus</i>
Scrub Squirrel	<i>Paraxerus jacksoni</i>	<i>P. ganania (aruscensis)</i>
Otomys Rat	<i>Otomys irroratus elgonis</i>	<i>O. divinatorum</i>
Tree Mouse	<i>Dendromys insignis</i>	<i>D. nigrifrons</i>
Longtailed Forest Rats	<i>Epimys jacksoni & dennie</i>	<i>E. jacksoni</i>
Pigmy Mouse	<i>Leggada triton</i>	<i>L. triton murilla</i>
Striped Rat	<i>Arvicanthia pulchellus massaicus</i>	<i>A. pulchellus ardens</i>
Fourstriped Rat	<i>A. pumilio diminutus</i>	<i>A. pumilio</i>
Tree Hyrax	<i>Procavia (Dendrohyrax) crawshayi</i>	<i>P. (D.) valida</i>
Elephant	<i>Elephas africanus pecti</i>	<i>E. afr. subsp.</i>
Bushpig	<i>Potamocharus cheroptomus kenie</i>	<i>P. ch. damonis</i>
Red Forest Duiker	<i>Cephalophus harveyi kenie</i>	<i>C. harveyi</i>
Suni Antelope	<i>Nesotragus moschatus</i>	<i>N. moschatus</i>

The most important difference between the faunas of Kenia and Kilimanjaro is that the Bongo and the Black Forest Hog do not extend into the latter district. Of less importance is perhaps the absence there of *Genetta stuhlmanni* which, however, belongs to the Central Lake district. *Nandinia* on the other hand is lacking on Kenia as far as is known for the present. If the little known *Cephalophus spadix* of Kilimanjaro is most nearly allied to the West African *C. niger* as TRUE has said, it is another hint about the affinity with the Western forest fauna. It does not seem impossible, however, that such an animal or a related form might be found in the thick forests on Kenia as well, although not yet known.

As a summary of the discussion above may be concluded that in the district on the Eastern and Northeastern sides of Kenia three different faunas meet and partly intermingle viz. 1^o the forest fauna of the mountain itself which shows several important western affinities, 2^o the fauna of the steppe country which is a typical East African fauna s. str., and 3^o the fauna of the thornbush which north of Guaso Nyiri is an almost pure Somali fauna.

There are thus three different types of faunas bound each to its own type of landscape (conf. above).

In the cultivated region, which mostly has been conquered from the forest, remains of the forest fauna meet invaders from the bushsteppe, and in some degree this is also the case in the xerophilous thin forests at the edge of the steppe.

In the district between Guaso Nyiri river in the north, and Tana river in the south many members of the Somali fauna and the East-African fauna s. str. meet. The former which preeminently is bound to the thornbush extends with some of its members still further south along the strips of thornbush in some instances all the way to the northern side of Kilimanjaro.

In the following systematic part the mammals collected by this expedition are enumerated with some notes about their occurrence and on their habits as far as any observations in this respect could be made. Too much work prevented me, however, from making a more thorough study of the biology which otherwise would have been of great interest to me, but I could not sacrifice much time on such problems.

In some cases I think that most probably the mammal quoted is only of sub-specific rank, but when I have not had the opportunity of forming myself an opinion about its relation to other forms I have used only binomials, although trinomials perhaps will prove better when more material has been studied. The law of priority has been followed except in one case, which will be mentioned below, because the confusion resulting from an alteration of this old well known name would be too great.¹

With regard to the correct determination of some specimens I have had the pleasure of consulting colleagues at other museums which is gratefully acknowledged here and especially mentioned in each case below.

Primates.

Cercopithecidae.

Colobus abyssinicus kikuyuensis n. subsp.

In the forests near Escarpment station I had the opportunity of collecting the six specimens of Guerezas to which I was entitled by my license. I had believed that the true *Colobus caudatus* should be met with at the locality mentioned, because that species has been recorded from Kenia, thus not very far from Escarpment. When I had shot the first pair, however, they appeared to me rather small and their tail-tufts were only little developed, whereas the black at the root of the tail had a broader extension than in the true *C. caudatus* from Kilimanjaro. The same observation was made on the following specimens obtained, and when I finally found that a small young was not white as that of the Kilimanjaro Guereza, it appeared evident that the Escarpment forests were the home of a separate race of Guerezas. This was also born out by a closer examination of the material at home, when the relative characteristics of the fur were supported by cranial measurements.

The new subspecies may be characterized in the following way: A Guereza closely related to *C. abyssinicus caudatus* THOMAS but smaller with the white tuft of the tail shorter and less developed, measuring to the tips of the hair 44 cm. in a rather old male, about 33 cm. in a young adult male and about 39 in the best female. The black of the upper side of the tail which terminally is more or less mixed with white extends in these three specimens resp. 27, 24, and 24 cm. from the root of the tail. The greatest length of single hairs in the tuft of the old male is about 18—19 cm. and much shorter in the other specimens. The hair of the

¹ I omit to change this name, for the present at least, because many prominent zoologists are agreed about the desirability of fixing certain old wellknown names to avoid confusion in spite of the priority law.

white mantle attain in the old male a maximum length at the shoulders of about 28—29 cm. and in the sacral region about 40 cm. In the female the same measurements are resp. about 23, and 25—26 cm.¹



Fig. 1. Young of *Colobus abyssinicus kikuyuensis*.

The most striking exterior difference between the Escarpment Guereza and that of Kilimanjaro is the difference in the development of the tail-tuft which in the latter is 15 to 30 cm. longer. This depends partly upon the fact that the tail-tuft begins where the white hair of the tail begin, and the black basal portion being longer in *C. a. kikuyuensis* causes the beginning of the tail-tuft to be removed further distally. But the Kilimanjaro Guereza has also longer hair in the tuft and at least often a longer tail (without hair), although its length is variable. Another difference lies therein that the hair of the black region of the tail in most cases is basally white in *C. a. caudatus* but in *C. a. kikuyuensis* it is as a rule entirely black or grey, although I have seen it whitish in one specimen.

The young of *C. a. kikuyuensis* (Fig. 1) is entirely different from that of *C. a. caudatus* which latter is white with a transverse triangular black patch on the head above the eyebrow stripe, and with blackish legs. A young *Colobus* from the forest at Escarpment exactly of the same size as the one from Kilimanjaro described above viz. about 23 cm. from the root of the tail to the vertex of the head in a straight line, and with the tail measuring about 24 cm. has almost the colours of the adult (conf. fig. 1). The white mane is not developed but foreshadowed by longer hair in the place where the mane shall

be developed later. These longer hair are, however, mixed black and white. In the sacral region white hair with dusky tips predominate. The back is not pure black

¹ These measurements may be compared with the corresponding ones of *C. a. caudatus* communicated by CAMERANO Ricerche int. al *Colobus occidentalis* ROCHEER., p. 15 (Il Ruwenzori, Rel. scient.).

as in the adult because greyish white hairs are mixed with the black. The same is the case with the upper portion of the tighs. Other parts are coloured as in the adult.

	<i>Colobus abyssinicus kikyensis</i>		<i>Colobus abyssinicus caudatus</i> ¹		
	♂ (old)	♀ ad.	♂ old	♂ ad.	♀ ad.
Condylolbasal length	101 mm	95 mm.	111 mm.	110 mm.	93
Basiscranial "	92 "	86 "	99 "	100 "	83,5 "
Occipitonasal "	91 "	89 "	101 "	102 "	88,5 "
Zygomatic breadth	79 "	80 "	89 "	92,5 "	75,5 "
Breadth of braincase	56 "	59 "	62 "	65 "	61 "
Least postorbital width	43,5 "	50 "	46 "	43,5 "	44 "
Least interorbital width below the nasal bump.	11,7 "	11,2 "	14,2 "	15 "	12 "
Breadth across middle of orbits	67,5 "	67 "	78,5 "	76,5 "	66,5 "
Length of palate mesially	53 "	48 "	58 "	57 "	52 "
Front of canine to back of m ³	41 "	37,3 "	44 "	44 "	40 "
Length of upper molar series	32 "	31 "	34 "	33,3 "	32,6 "
Breadth of snout across last premolar	36 "	33,4 "	39,2 "	38,8 "	34,5 "
Distance from occiput to middle of superciliary ridge	78,5 "	78,3 "	88 "	88,3 "	77,3 "

The measurements above prove that the males of the Kilimanjaro Guereza have considerable larger skulls in every respect than the Escarpment Guereza. The difference between the female skulls is, however, less apparent, and some dimensions may even be larger in the Escarpment Guereza. That female animals of two geographic races are rather similar while the males are very different is a common occurrence. That the Kilimanjaro Guereza belongs to a larger race is among other things indicated by the teeth being, even in the females, larger than those of the Escarpment animals. In the former the ridge above the orbits (the eyebrow-ridge) is less prominent and situated lower down when compared with the vertex of the skull than in the latter. The profile contour of the Escarpment Guereza (Pl. I, fig. 1) is therefore much more evenly sloping than in the larger race. This difference is well visible in the females as well.

The forest inhabited by the new race of Guereza is partly not very thick, but the undergrowth consisting of tall herbs, bushes and small trees is very thick in such places where the big trees stand a little apart. In the early morning the males were heard producing the same humming or buzzing noise (something like «brm brm» long continued) as has been described for other Guerezas. When comparatively low trees this monkey hastens to escape, but in high trees it often thinks itself safe, and it can hardly be termed very shy. For a person who has a little time to spare it is easy to shoot the 6 specimens which are permitted by the shooting license, and this number is far too great to afford sufficient protection for the species, if it should become fashionable among sportsmen to secure their full allowance of Guerezas in the Escarpment forests.

If a Guereza remains motionless, hidden among the branches, foliage or lichens in a high tree it may be difficult to see just as every other object under similar circumstances, even if it is coloured differently.¹ But as soon as the Guereza moves, or if it is not directly hidden it is very easily seen. When I now have had a little personal experience in this matter it is difficult for me to believe in the protective colouration of this animal at least in such surroundings as those in which I have seen it.

When passing through the primeval forest on Kenia I saw Guerezas twice, once at a long distance when looking over the tops of the trees in a valley an early morning at sunrise, and another time at less distance, but as I was not able to secure any specimen I cannot say from my own experience whether it is more like the Kilimanjaro race than this race, or not, but OLDFIELD THOMAS has stated (Proc. Zool. Soc. London 1900, p. 174) that there is no difference between specimens from the western slopes of Kenia (8,000--10,000 feet altitude) and specimens from Kilimanjaro.

*Cercopithecus*² *kolbi* NEUM.

Росоок: Proc. Zool. Soc. 1907 p. 703.

This is the common »Kima» of the forests of Brit. East Africa. I collected a good series of both sexes in different ages as well in the forests round Nairobi (f. i. at Mc Naughtons farm, and Sandback Baker's »The Homestead») as at Escarpment station which appears to be the type locality of the species.³ It was also observed in the big forest on the slopes of Kenia even at an altitude of 2,700 m. where bamboo thickets are interspersed in the regular woods. It was common in a forest near Meru boma. One specimen of the same kind was also shot in a grove of big acacias at upper Luazomela river, but this place appears to be outside its regular haunts because the Kima is evidently a forest loving animal. It is, however, found as well in the xerophilous forest edging to the steppe as all through the primeval forest up to the bamboo. It occurred usually in small bands about half a dozen or a dozen in number but old males were often seen single. In the forenoon they were sometimes observed resting on a branch of some big tree, or even basking in the sun on a branch or on a fallen tree. As a rule, however, they occurred in the thick forest, and fled with great speed at the approach of the hunter, jumping from tree to tree. Sometimes they took refuge to a very high tree and felt safe there hiding behind the branches or among the foliage.

¹ In similar cases it is just as difficult, if not more, to see a »Kima», or a »Tumbili» (conf. below) than a »Mbega» (= Guereza).

² It has recently been proved that the proper name of this genus ought to be *Lasiopyga* if a strict priority should rule. As such a change would create great confusion I cannot for the present accept this ELLIOT'S proposal especially as *Cercopithecus* should not be rejected but moved to *Midas*.

³ Conf. Proc. Zool. Soc. London 1902 p. 144.

Among the differences between this species and *C. albatorquatus*, NEUMANN¹ mentions the red anal region of the latter. In consequence of this Pocock² states that in skins from the Kedong Escarpment (probable the same as the present Escarpment railroad station), and such from Boromo a considerable quantity of brownish red hair is to be found at the sides of the ischial callosities, while in specimens from Nairobi this is less well developed. Pocock appears therefore to be in doubt whether more than one species is here involved. The present material appears to throw light on this question. In four fine old males from the forest at Escarpment station the red of the ischial and anal regions is absent except in the specimen with the shortest canines and smallest skull which thus may be assumed to be the youngest, although it is fully adult. In a younger female from the same locality the red is well developed in the region mentioned. The same is the case with all the specimens from Nairobi, although it is least abundant in the two oldest females, and best developed in a quite young animal in which the first molar has not yet appeared. In this latter the red hair of the anal region extend even to the root of the tail. To judge from these facts the presence of red hair in the anal and ischial regions of this species evidently is a juvenile characteristic which, more or less completely, is lost during the ontogenetic development when the animals reach full maturity or old age. This accounts for the seeming irregularity in its development. There is also very little probability that two allied species of *Cercopithecus* should live the one at Escarpment and on Kenia, and the other in the forests near Nairobi.

There is a great difference in size between males and females of this species. This may be seen from the following measurements:

	Greatest length	Basicranial length	Condylobasal length
Adult male from Escarpment	116 mm.	88.5 mm.	95.5 mm.
" " " "	115 "	79.0 "	95.0 "
" " " "	114 "	82.0 "	92.0 "
" female from Nairobi	99 "	70.8 "	77.3 "
" " " "	98 "	70.0 "	77.0 "
" " " "	97 "	68.0 "	76.4 "

DOLLMAN has named a female specimen from Nairobi *Cercopithecus kolbi nubi-lus*.⁵ This is said to be distinguished by its much duller colour of the dorsal surface lighter under parts, and less conspicuous white collar. All these characteristics are rather variable. I have in this collection specimens from Nairobi which are just as bright in their colours as specimens from Escarpment and Kenia which, however, as living at a higher altitude have a somewhat thicker and longer fur. Some of the

¹ Proc. Zool. Soc. London 1902 Vol. II pl. 1 p. 144.

² Proc. Zool. Soc. London 1907 p. 703.

³ Ann. & Mag. Nat. Hist. Ser. 8, Vol. V. 1910 p. 202.

specimens from Nairobi are even more reddish on the back than some of the specimens from Escarpment, for instance. The under parts have about the same colour. The white collar is just as well developed in good specimens from Nairobi as in specimens of corresponding age and sex from Escarpment, and the difference in the length of the fur is not so great as it will appear from DOLLMAN's description. Good females from Nairobi have the hair on the middle of the back averaging from 45 to 55 mm., and in females from Escarpment it is not much longer. In male specimens the fur is somewhat longer in both localities.

That much is admitted that there may be seen a certain difference in the length and thickness of the fur between specimens of this species obtained at Nairobi (5300 feet above the sea level), and such from Escarpment (about 8,000 feet above the sea), or from Kenia at high altitudes. But this difference is not of specific, subspecific or racial importance because all three localities belong practically to the same group of forests, and there are all kinds of intermediate localities where all degrees of intermediate development of the fur can be found in direct correspondence to the climatic conditions at every different place.¹ It is even quite probable that such a little difference in density and length of the fur may change individually. If for instance a specimen moved from the forests on the lower slopes to a higher altitude with a cooler climate this same individual would without doubt develop a thicker fur. This is only in accordance with the well known fact, that an animal, for instance an antelope of some kind, transferred from Africa to some zoological Garden in Europe will in the latter place develop a thicker fur.

Specimens from the forests at Meru boma are similar to those from Nairobi of corresponding sex and age.

I have not seen any specimens in which the ear tufts have been banded as shall be the case in the subspecies *hindei* described by Pocock from Tutha in the Kenia district, 8000 ft. altitude.*² This altitude is about the same as that of the Escarpment.

From the Kima of Kilimanjaro which I have described³ under the name *Cercopithecus albogularis kibonotensis* this species is easily distinguished by several characteristics. Above all the white of the throat is much less extended in the Kilimanjaro Monkey, in which it does not reach so far down on the neck, and still less up on the sides of the neck. Its hindlegs are much blacker than in *C. kolbi* in which latter they are speckled so that their general colour appears to be dark grey. The

¹ In this case the different climatic conditions and their results on the animals stand in connection with differences in vertical distribution. But quite analogous things can be found in certain countries for instance our own, as results of different horizontal distribution. Take a Squirrel or a Fox caught in January in Scania, and compare it with a corresponding specimen caught in Upland at the same time of the year, and the difference in fur will be greater even than between the Nairobi and Kenia monkeys, but nobody regards them as belonging to different races as all intermediate conditions are to be found. If the comparison is extended to animals from Lapland the result will be still more striking.

² Proc. Zool. Soc. 1897 p. 704.

³ Mammals: in Wiss. Ergebn. Schw. Zool. Exp. Kilimandjaro Meru 1905—1906 von Y. SJÖSTEDT. Uppsala 1908.

white ear tufts of *C. kolbi* are also an easily recognized characteristic. The two species evidently substitute each other in their different areas of distribution.

*Cercopithecus pygerythrus*¹ *luteus* (ELLIOT).

C. centralis luteus ELLIOT Smithson. Misc. Coll. Vol. 56, n:o 7 Washington 1910.

The specimens which I refer to this race were collected partly at Kanyakeni situated one days march south of Meru boma (3 specimens)^{2a}, at the latter place (1 specimen)^{2b}, and at Guaso Nyiri below Chanler Falls (1 specimen)^{2c} 1911. These specimens are similar inter se, and I think they ought to be regarded as identical with ELLIOT's monkey from Wambugu, southwest of Mount Kenia, although my localities are on the northeastern side of that mountain, and although the distinguishing characteristics are not so sharply developed as in ELLIOT's type specimens.

The author quoted says that the monkey which he has given the subspecific name *luteus* is somewhat similar to *C. c. Johnstoni*, from the south of Mount Kilimanjaro but differs altogether in its buff underparts and inner side of limbs, the corresponding parts of *Johnstoni* being 'grayish white'.

In my specimens the 'buffish' of the under parts is well developed only in one of the specimens from Kanyakeni in the interbrachial portion of the breast. In the others the 'buffish' is only represented as a slight tinge of the white which is best seen by direct comparison with Kilimanjaro specimens. Such a direct comparison also proves that the specimens of the Kenia district are more brightly ochraceous buff on the upper parts, and this colour extends further backwards than in the specimens from Kilimanjaro. Thus the hair on the upper parts of the hind legs, and on the basal parts of the tail are partly ringed with this colour in the former, while the corresponding parts in the latter are almost entirely grey without any buff rings.

The type specimens of ELLIOT's Monkey are said to have 'feet iron grey'. This is, however, probably to be regarded as a juvenile (or perhaps feminine) characteristic, as only one of my specimens a young female from Guaso Nyiri has grey feet. The others being adult males have black feet.

As ELLIOT's specimens were 'young adults, females' the following dimensions of adult male skulls may be of value:

Total length	105 mm.	109 mm.	109 mm.
Occipito-nasal length	85 "	88 "	90 "
Basiscranial	71 "	73,5 "	75 "
Zygomatic width	69 "	70 "	72,5 "
Length of upper molar series .	24,5 "	25 "	24,5 "

The scrotum is in the living specimens beautifully turquoise-blue. Since the above was written HOLLISTER has described² a Monkey from the south side of Lake

¹ Conf. CABRERA: Specif. Names of cert. Primates. Ann. & Mag. Nat. Hist. Ser. 8 Vol. VI p. 617.

² Smitson. Misc. Coll. Vol. 59 n:o 3 Washington 1912.

Naivasha, British East Africa, under the name of *Lasiopyga pygerythra callida*. As this race is said to have less yellow in coloration of back it can hardly need further comparison with the present specimens. The feet are said to be black even in the young specimens.

This monkey is the "Tumbili" of British East Africa. In its habits it is entirely different from the Kima. The Tumbili does not live in thick forest but belongs to more open ground. It is seen in the thornbush as well as on the acacia steppe and runs much on the ground, sometimes rather far from any trees. The thin forest belts which often fringes the East African rivers appears to be the regular home of the Tumbili and to them they return and take refuge in the highest trees if any danger threatens them.

Sometimes they appear to have certain routes which they know of and use when they seek safety. At Guaso Nyiri below Chanler Falls I had once seen a band of Tumbilis run down from the thornbush to the trees at the river side, but when I came there they had disappeared. A few days later I observed them almost in the same place again, and I ran as quickly as possible with my gunbearers to intercept them. It appeared almost certain that we should succeed because there were only a few trees on our side of the river. When we came nearer, however, I saw the last of the Tumbilis take a flying leap from a tree on a small island to the opposite side, and thence they continued to travel with great speed along the river on the opposite side. An examination of the conditions revealed how the Tumbilis had reached safety. A tree had fallen from the north bank and lay across a branch of the river forming a bridge to the western end of a small narrow island. At the eastern end of the same a big tree leaned over towards the southern side so that from its crown the monkeys could make a long leap and get hold of the branches of a tree on the southern side. This accounted for the mysterious disappearance the first time, and explained also why the Tumbilis ran down to the river at the same place the second time. This was evidently a, to them, well known route which they had used before. Only a young female which remained on the island, possibly not daring to make the last long leap across the southern branch of the river, could be added to the collections. The Tumbilis occurred usually in small flocks but several times single Tumbilis were seen in the interior of the thornbush, sometimes far from any other water than that in the holes dug by the Rendiles, as at Njoro and Thera, in otherwise dry riverbeds.

¹ HOLLISTER has recently (Smithson. Misc. coll. Vol. 56 No 2. Washington 1910, p. 11) described a monkey of the *patas*-group from Brit. E. Africa under the name of *Erythrocebus whitei*. The type locality of this species is "Nzoia River, Guas Ngishu Plateau". MATSCHKE described 1905 a monkey from Ikoma and belonging to this group under the name of *E. baumstarki*. Although I have not myself seen any red monkey during my expedition to Brit. E. Africa I think it worth mentioning that I heard stated by Dr. WALSH that he had shot a red monkey which according to the description must have been a member of the *patas*-group. This happened not far from Ulu station of the Uganda railroad in April 1911. Dr. W. observed it running at a long distance and shot at it believing it to be a Cheetah, and he confessed to be very astonished to see this strange-looking animal when he had killed it. The occurrence of a monkey of this group as far south-east as Ulu appears rather interesting, but as I have not seen the specimen I cannot tell whether it belongs to any of the species mentioned above.

At Meru boma I succeeded in shooting a fine male Tumbili just as it intended to make a raid in a shamba with *Pennisetum*.

Papio anubis subsp.?

(Conf. ANDERSSON: Zool. of Egypt. Mammalia p. 34.)

Dark Baboons of the *anubis*-group were seen by me for the first time at Mc Naughtons farm not far from Nairobi, where they were said to do much damage in the farm, and especially destroy the crop of sweet potatoes and potatoes.

Similar Baboons were also common around Escarpment station where the Kikuyus complained of their ravages in the shambas. In both these places they occurred in herds which took their refuge to thick bush and forest as soon as they suspected any danger. The angry bark of the old males warned the herd to continue the flight. Now and then a big male was seen at some safe distance ascend a small tree or a stump to look round, but they always jumped down and ran away in good time. They avoided very carefully to come within range for the shotgun which was the only weapon I had with me then. They are also very tenacious of life, and although a fullgrown male was shot full in the chest with SSG at either of these localities mentioned both dragged themselves away in the bushes and were lost. On account of this bad luck I cannot dare to say anything more about the Baboons of Nairobi and Escarpment except that they certainly belong to this group of the genus, as was proved by the general darkness of their fur, by their black faces, and purplish brown colour of the naked parts around the callosities which details I observed with full certainty with my field glass. It is, however, quite possible or even probable, that they belong to the same race as the Baboons of the Guaso Nyiri district, described below.

Papio anubis furax (ELLIOT).

ELLIOT: Ann. & Mag. Nat. Hist. Ser. 8. Vol. 20 p. 499.

In the work 'Zoology of Egypt', Mammalia, ANDERSON has proved that the oldest specific name given to a blackfaced, dark green Baboon with purple-brown callosities is *anubis* FISCHER 1830. Of this group a number of so called species have been described, but at least a part of these are only comparatively slight modifications of the *anubis*-type and do not deserve, according to my opinion, to be regarded as possessing higher rank than that of geographic subspecies. This is also the case with some Baboons which I shot in the thornbush north of Guaso Nyiri. In their general colouration some of them agree quite well with ANDERSON's plate (op. cit. Pl. IV) of *Papio anubis* from Abyssinia = *Papio doguera* PUCHERAN. The skulls of my specimens are, however, smaller than the skulls of Abyssinian Baboons according to the measurements recorded by ANDERSON (l. c. p. 40). They agree with regard to their

size better with the specimens described from Baringo and Nandi by ELLIOT under the name of *P. furax*. But strange to say there are to be seen among the skulls from Guaso Nyiri not only such differences which can be explained as due to individual variation but also others which appear to be of more importance. The differences between the skulls of different ages are fully shown by the dimensions of the skulls *a* and *b* as recorded in the accompanying table of measurements. These two specimens (Pl. I fig. 4 & Pl. II figs. 1 & 2) were shot in the same place and out of the same herd on the north bank of Guaso Nyiri some distance below Chanler Falls. Specimen *a* is a very old male (Pl. II fig. 1) with the canines worn off to the same level as the other teeth which all of them are strongly worn, and the lower incisors have even disappeared. Specimen *b* is a fully adult male (Pl. I fig. 4, Pl. II fig. 2) in its prime of life. Its formidable canines are about 40 mm., and the molars are very little worn but the incisors somewhat more. It is evident that the differences between skulls *a* and *b* are due to age, and a comparison of their dimensions reveals the differences which are connected with increasing age.

Specimen *c* is a rather old male (Pl. I figs 2 & 3) with incisors as well as molars strongly worn. The canines are also worn down to a length of about 33 mm. Specimen *c* is intermediate in age between *a* and *b*, and thus if a dimension in *c* is intermediate between the corresponding ones of *a* and *b*, this is evidently a dimension which alters with increasing age. A fine example of this is the distance between the last molar and the posterior border of the palate. But there are other dimensions of this skull *c* which are not intermediate between those of *a* and *b*, nor similar to either of them, and the differences thus exhibited by skull *c* appear to be of more importance than the others.

These differences in dimensions indicate that specimen *c* has a shorter muzzle so that the distance from the mesial point of the superciliary ridge to the lip of the premaxillary is considerably shorter than in specimens *a* and *b*. The nasals (if measured in a straight line) are also shorter in the former than in the two latter (conf. the table). The shortness of these measurements is, however, partly due to the fact that the orbits are more abruptly raised in *c* (Pl. I fig. 3) than in *a* and *b* (Pl. I fig. 4) and the facial surface of the orbital walls forms almost a right angle to the flat upper surface of the muzzle in *c*, while the same angle is somewhat more obtuse, and the profile on a level with the orbits more slanting backwards in *a* and *b*. But the muzzle is really shorter in *c* than in *a* and *b* as is proved by comparing the respective distances from the middle of the lower border of the orbit to the tip of the nasals (conf. the table). Skull *c* is also considerably broader across the orbits than skulls *a* and *b*. This is due to the great breadth of the facial surface of the outer walls of the orbits in *c*, because the inside distance between the lateral walls of the orbits is even a little shorter than in *a* and *b*.

Although these cranial differences are not very great, they appear to be of importance, especially as they are supported by differences in the colouration of the fur as well. Specimens *c* and *d* which were shot on the north bank of Guaso Nyiri above Chanler Falls and only about one, or one and a half days march to the east

of the crossing of the Marsabit-road, are decidedly more brown and less ochraceous than specimens *a* and *b*.

Specimens *c* and *d* agree nearly with regard to their colour with ELLIOT's description of *P. furax* from Baringo and Nandi. The general colour tends to seal brown and the rings of the hair are decidedly paler than in the other specimens. The tail appears to be rather short, about 44 cm. (without hair) in the male.

It must nevertheless be admitted that the difference is not very great, at most of subspecific value, and, perhaps, I should not have been inclined to go even so far if not other members of the fauna as well had proved to be different above and below Chanler Falls. There are thus different races of *Rhynchotragus* and *Procapra* (*Heterohyrax*) in the corresponding two localities (conf. below).

There ought also to be said a few words in explanation of the degradation of *P. furax* to a subspecies. This has been done, because some of the cranial characteristics especially enumerated by ELLIOT have been proved by the present material to be variable. ELLIOT says that the rostrum is "broader" in *furax* than in *doguera*. This measurement increases considerably with age and is 7½ mm. larger in *a* than in *b*, although even the latter is fully adult, and both hail from the same herd. It is true that these specimens are not real *P. furax* but very near relatives and standing, as will be seen later on, between that race and *doguera*, and then the same laws for changes with age may refer to *furax* as well. The distance between the last molar and the posterior border of the palate is also very much increased with age as can be seen from the table of measurements. The pit on the side of the upper jaw is very different in the specimens *a* and *b* being much more pronounced in the latter which proves that this is not a specific character. The zygomatic width is often rather variable and apt to increase with age when the musculature is more powerfully developed.

Considering all these facts I think it is most suitable to regard *furax* only as a geographic subspecies of *P. anubis*.

	N. of Guaso Nyiri			
	Chanler Falls			
	below		above	
	<i>a. ♂</i>	<i>b. ♂</i>	<i>c. ♂</i>	<i>d. ♀</i>
	very old	ad.	ad.	semiad.
Total length	211 mm.	201 mm	201,5 mm.	152 mm.
Occipitonasal length	169,5 "	161 "	160 "	120 "
Basiscranial "	147 "	142 "	146 "	105 "
Zygomatic width	121,5 "	115 "	117 "	94 "
Palatal length (inside between median incisors)	93 "	83 "	88 "	62 "
Width of braincase	86 "	79 "	83 "	73 "
Least postorbital width	58 "	54 "	53 "	52 "
Interorbital width	12 "	10 "	11 "	11,4 "
Length of nasals	76 "	72 "	64 "	41 "

	N. of Guaso Nyiri			
	Chanler Falls			
	below		above	
	a. ♂	b. ♂	c. ♂	d. ♀
	very old	ad.	ad.	semiad.
Length of upper molar series	48,5 mm.	52,7 mm.	48 mm.	47 mm.
Width of snout across first premolar	54 »	51 »	51 »	40 »
Length of lower molar series	65 »	61 »	61 »	51 »
Distance from mesial point of superciliary ridge to tip of pro- maxillary	138 »	128 »	119 »	83 »
Distance between outer brims of the orbital walls at the middle of the orbit	87 »	86 »	93,7 »	70 »
Distance from middle of lower border of orbit to tip of nasals .	65 »	64 »	58 »	36 »
Distance between last molar and posterior border of palate . .	30 »	14 »	23 »	—
Width of palate between last molars	30 »	24,7 »	28,5 »	24 »
Width of the flat area of the muzzle halfway between orbits and tips of nasals	45 »	37,5 »	41,5 »	—
Breadth of facial surface of the lateral wall of the orbit at the middle of the orbit	11	11	16	—

Papio anubis doguera PUCHERAN.

ANDERSON: Zoology of Egypt, Mammalia, Pl. IV & VII.

The Abyssinian member of the *anubis*-group of Baboons was called *doguera* by PUCHERAN¹ and the whole description was: *major, brunneo olivaceus; manibus anticis nigro irroratis.* Later authors have added to this description. MATSCHE determined certain Baboons in the museums in Munich and Frankfort² to be *Papio doguera*, and ANDERSON published soon afterwards in «Zoology of Egypt, Mammalia» a fine coloured plate of the Munich specimen and figures of the skull, as well as numerous cranial measurements.³ Thanks to this it is possible to conceive a clear opinion about this Baboon.

The specimens termed in the above table of measurements *a* and *b*, and, as is already mentioned, shot at Guaso Nyiri below Chanler Falls resemble very closely with regard to their colour ANDERSON's plate quoted. The older is even more ochraceous yellow than the younger and thus more unlike *P. a. furax*. Length of the hair on the back above the shoulders 10½–13 cm., further back above the hind-quarters 4–5 cm.

In general proportions the skulls of my two specimens (Pl. I fig. 4, Pl. II fig. 1 & 2) also resemble the figures in ANDERSON's work of the skull of the Munich specimen regarded as *P. doguera*, especially if regard is paid to the fact that this

¹ Rev. et Mag. Zool. 1856. p. 96.

² Sitz-ber. Ges. Naturf. Fr. Berlin 1898. p. 80.

³ L. c. Pl. IV & VII, and p. 40.

skull is about intermediate in age between the two skulls of this collection. But if the measurements recorded on the accompanying table above are directly compared with those in ANDERSON'S table of measurements (l. c. p. 40, specimens 1 and 4) it will be seen that the former as a rule are somewhat smaller. If due regard is paid to the changes which are connected with increasing age (conf. above) this difference in size appears to indicate among other things a somewhat shorter snout and less width of the facial parts in the specimens from Guaso Nyiri. It is not excluded that such differences are due to individual variation as the material for comparison is not great and I have therefore used the same subspecific name for my specimens as for the Abyssinian representatives of the *ambis*-group.

These Baboons lived in numerous herds in the thornbush country north of Guaso Nyiri. Sometimes they inhabited high and steep rocks and had their stronghold among gigantic blocks to which they took their refuge when danger threatened. In other places they fled into the dense thornbush in similar cases. In localities where there were no rocks suitable as night quarters the Baboons used to ascend some of the trees growing near the river and sleep in them, and it seemed as if the same trees were used night after night. The reason why a tree is selected for night quarter is evidently because it affords protection against attacks from Leopards. If a man approached the tree the Baboons bounded to the ground and ran into the thick bush as quick as possible. This happened even if it was so late at night that the sun had set, as I observed myself once when it was so dark that I could not see to aim and shoot. Before they ascended the tree for the night they used to drink their fill in the river. I found that the Baboons in the thornbush north of Guaso Nyiri fed largely on a fruit which had a plum-like appearance. Their ventricles were filled with masticated bits of such plums and the cheek pouches contained intact fruits of the same kind. They were green, of the size of an olive and contained a stone like that of a plum. It was, however, no plum as the leaves of the bush which I saw once or twice in early development (otherwise the branches were naked) were pinnate. When not fully ripe it had a very strongly adstringent taste but in fully ripe condition it had a sweetish and not unpleasantly aromatic flavor, something reminding about italian vermouth.

Prosimiæ.

Nycticebidae.

Galago (Otolemur) kikuyuensis LÖNNBERG.

LÖNNBERG: *Ann. & Mag. Nat. Hist. Ser. 8 Vol. IX p. 64.*

In the year 1905 MATSCHIE¹ characterised the groups or subgenera within the genus *Galago* typically represented by *G. agisymbanus*, viz. *Otolemur*, and by *G.*

¹ Sitz.-ber. Ges. Naturf. Freunde Berlin 1905, p. 277.

garnetti, viz. *Otogale*, in the following way: In *Otolemur* the orbit is much broader than the distance between the gnathion and the anterior margin of *foramen infra-orbitale*. In *Otogale* these distances are about equal. In *Otolemur* the nasals are at least as long as the distance between the gnathion and the anterior brim of the orbit, in *Otogale* shorter. In *Otolemur* the ears are shorter, in *Otogale* longer than the hands. In *Otolemur* the ears are much shorter than two thirds the length of the head, in *Otogale* about equal to this latter dimension.

According to this definition the subgenus *Otolemur* included at the time mentioned the following species: *O. agisymbanus*, *lasiotis*, *panganiensis*, and *badius*, while *Otogale* embraced *O. garnetti*, *crassicaudatus*, *monteiroi*, and *kirki*.

The present species is evidently a member of the subgenus *Otolemur* the diameter of the orbit measuring 17 mm. while the distance between the gnathion and the anterior margin of *foramen infraorbitale* is 14.5 mm. The length of the nasals is 19 mm. while the length of the preorbital portion of the skull is 18.3 mm. The ears are short and naked. General colour (Pl. IV fig. 1) of the upper parts pale greyish brown, somewhat darker on head and upper neck, outside of limbs more chamois. Throat and lower side of neck pale with an ochre yellow tinge or similar to 'maize yellow' n:o 2 according to 'Répertoire de couleurs'. Inside of fore limbs and under parts of body dirty white, inside of hind limbs more brownish. Hands and feet dark brown inclining to blackish. Tail rather dark brown above, gradually darkening to blackish brown towards the distal third, pale snuff brown on the lower side. The fur on the back very soft, 23—25 mm. dark slate-coloured for the greater part with broad subterminal rings similar to 'chamois' n:o 1 (Répert. de coul.) and with dark brown tips which in the majority of the hair is short, but in the longer hair are longer than the chamois-coloured rings.

Total length about 62 cm. Tail about equal to head and body in length.

Greatest length of skull	61 mm.
Basiscranial length	49 "
Greatest zygomatic breadth	41 "
Palatal length	23 "
Length of upper molar series	19.5 "

These skull measurements agree closely with those recorded by ELLIOT for a species described by him under the name *Galago hindei*.¹ This species which has been collected at Kitui, Athi River, Brit. East Africa, must, however, in other respects differ rather widely from the one now described. The total length of *G. hindei* is said to be about 57.5 cm., and the tail is indicated to be 37 cm. It must thus have a very short body, only about 20¹/₂ cm., and it is certainly much shorter than the tail which is stated to be 'very long', 'almost white' ('above pale wood brown, beneath whitish'). The hands of *G. hindei* are also said to be 'like head' viz. pale wood brown washed with darker brown.

Otolemur panganiensis MATSUIE from the Kilimanjaro district has the tail considerably longer than head and body and a much larger skull attaining a maximum

¹ Ann. & Mag. Nat. Hist. Ser. 7, Vol. XX 1907, p. 186.

length of 75 mm. and a basiscranial length varying between 58 and 62,5 mm. *O. badius* from Ugalla, German East Africa, is dark reddish brown. *O. lasiotis* from Mombasa has hairy ears and white tail. *O. agisymbanus* from Zanzibar appears to be a smaller animal than the one now described with the length of body 20 $\frac{1}{2}$ cm., head 5 cm., and tail 22 cm., according to the original description¹ by COQUEREU.

The type specimen of *Galago (Otolemur) kikuyuensis* was shot in the forest near Escarpment station at an altitude said to be 8,000 feet, the 7th of Jan. 1910. It was an adult male. I found it in the evening when it had already become so dark that it only with difficulty could be seen against the sky. Although I tried to secure some more specimens walking through the forest in the evenings before and after sunset, I did not succeed. My gunbearer saw once a second specimen jump from a tree to another, and we heard the 'Komba's' chattering scream now and then in the evening, that was all. One night part of a *Dendrohyrax* which I had shot in the evening before but which remained hanging on a branch, was eaten, and my 'boys' who brought it down in the morning said that it was the 'Komba's' work.

Gallago gallarum THOMAS.

THOMAS: Ann. & Mag. Nat. Hist. 1901, Ser. 7, Vol. VIII, p. 27.

This beautiful little Galago is not uncommon in the dry thornbush country north of Guaso Nyiri, and it may be seen astir and moving about in the bushes even in broad daylight. The first specimen was observed by the present author in the bushes bordering the dry bed of a small rivulet at Njoro². It was not shy at all, but I had no shotgun and was just trying to stalk a Giraffe at that moment, so I had to leave it alone. About 3 weeks later when we were camping north of Guaso Nyiri below Chanler Falls I saw another specimen which jumped up from the lower branches of a bush to the top of the same where it stared at us. This specimen was secured. The same day ¹²/₃ the negroes accompanying Mr. CUNNINGHAM stoned another specimen which also was preserved. The following day I found not less than 3 specimens in a horribly spiny acacia bush, in which they moved with great dexterity, although it appeared almost impossible to evade the sharp spines. Two were shot in the bush and the third on the ground where it tried to run away with long jumps.

The description published by THOMAS (l. c.) corresponds almost in all details with my specimens. As I unfortunately have no access to RIDGWAY's nomenclature of colours I do not know exactly what his 'ceru drab' is like. When my specimens were alive climbing and jumping in the bushes they gave the impression of being light grey with light ochre-yellow, or perhaps better honey-yellow hind legs. When made into skins the reddish fawn or vinaceous cinnamon below the tips of the hair shines through in some places and in others the black terminal rings of the hair form

¹ Rev. et Mag. de Zool. 2 Ser., T. XI Paris 1859, p. 459.

a blackish cloud. The tail darkens gradually from pale grey at the base to black at the end. In younger specimens the tail is more or less brown especially in its apical half, but it also will appear that the black in the outer part of the tail fades into brown before it is shed, for some specimens have new hair with fresh colour on the basal half of the tail and the old hair of the apical half more or less brown.

The length of the tail varies in adult animals from 27 to 29 $\frac{1}{2}$ cm. without hair, in the younger it is about 25.

Total length of skull in an old male specimen with worn teeth 45 mm.; condylobasal length 39,3 mm.; basicranial length 34 mm.; zygomatic breadth of skull 32,4 mm.; length of tooth row from front of canine to back of m^3 15,4 mm.; length of parietal suture 19 mm.; breadth of braincase 23,5 mm.; length of nasals mesially 12,5 mm.

The total length of the skull of a younger animal is 42,5 mm. but the tooth-row has, of course, the same length as in the old animal.

G. gallarum is an easily recognized species as already pointed out by THOMAS. Since *G. gallarum* was described, DOLLMAN has named another *Galago* from Somaliland (‘Fafan 35 miles east of Harrar’) *G. dunni*.¹ The latter has, however, a larger skull, and has no fawn or drab colour.

Another more northern relative is *Galago teng* (SUNDEVALL). By mistake the type locality of this species is said to be: ‘Mombasa, Taita’, in TROUESSART’s ‘Catalogus Mammalium’. SUNDEVALL writes about this: ‘Habitat in Sennaar et Kordofan, circa Bahr el Abiad’, and these words are quoted directly from the collector himself Dr. HEDENBORG.

A direct comparison between a male skull of *G. gallarum* of this collection and the skull of the male type specimen of *G. teng* proves the latter to be rather more slenderly built. *G. teng* has the posterior half of the nasals narrowed (but a little widened again at the end), and the cavities on the sides of the snout more pronounced than in *G. gallarum*. The least interorbital breadth is only 5,2 mm. in *G. teng*, while the same measurement is 6,2 mm. in *G. gallarum*. The latter has more outstanding orbits, and much heavier and broader zygomatic arches already in young specimens. On the other hand the tooth row is about 1 mm. longer in *Galago teng*.

Galago teng has no drab or fawn colour in its fur and resembles in this respect *G. dunni*. Another resemblance between these two is the shape of the nasals as described above for *G. teng* and by DOLLMAN for *G. dunni*. It appears thus probable that *G. dunni* may be a subspecies of *G. teng*.

¹ Ann. & Mag. Nat. Hist. 1910 Ser. 8, Vol. V p. 92.

Chiroptera.

Pteropodidæ.

Epomophorus wahlbergi SUNDEVALL.

K. ANDERSEN: Cat. Chiropt. B. M. 1912, p. 526.

This Fruit-eating Bat was only observed once viz. at the upper Luazomela river where it flows down to the acaciasteppe one days march north of Meru boma. A small colony consisting of a male and three females were found hanging in a large bush with yellow flowers in a grove of big yellow-barked acacias. They were picked down with the specimen gun, and two of the females carried young, measuring about 6 cm. from vertex of head to vent the 20th of March 1911.

This species appears to be distributed from South Africa to East Africa as far north as to Mount Kenia. The present locality is thus, as far as is known, its northern limit. Since this was written I have had the pleasure of receiving a paper¹ from G. M. ALLEN in which he records *E. neumanni* from a locality probably very near the one where I collected mine.

Nycteridæ.

Lavia frons frons (GEOFFROY) and **L. f. affinis** ANDERSEN & WROUGHTON.

ANDERSEN & WROUGHTON: Ann. & Mag. Nat. Hist. Ser. 7, Vol. 19, 1907, p. 138.

A single male was shot in a patch of thornbush at Lekundu river, just south of Guaso Nyiri¹⁰ 1911. This specimen has a cranial length of 25,8 mm. and the length of the upper tooth row is 9,5 mm. To judge from the measurements of these parts quoted by ANDERSEN and WROUGHTON (l. c. p. 139) this specimen should belong to the larger race *Lavia frons frons* (GEOFFROY).

North of Guaso Nyiri below Chanler Falls I shot a pair of this kind of bats in the thornbush¹⁰ 1911. The upper tooth rows of these two specimens measure only 8,7 and 8,8 mm. resp. This should according to the authors quoted indicate that these specimens belong to the northern smaller race *Lavia frons affinis* ANDERSEN WROUGHTON. The length of the forearm in the female is 56 mm. thus a measurement which can be found in both races. In the male the corresponding bones have been broken by the shot. The size of the ear of the specimens from the northern and southern sides of Guaso Nyiri is also different being smaller in the former. The dimensions of the different phalanges of the fingers etc. are also smaller in the specimens from the northern side of Guaso Nyiri than in the one from Lekundu. Although it is difficult to pass a definite judgement on so little material, it appears

¹ G. M. ALLEN: Bats from British East Africa. Bull. Mus. Comp. Zool. Vol. LIV N:o 9, p. 322.

probable that the small northern race extends southwards to Guaso Nyiri and in that region meets the larger southern race, perhaps both blend together there.

This bat is found hanging in the leafless bushes, quite exposed to the sun-rays as it seems, and flies away when one approaches finding its way quite well in broad daylight. The wings of the flying bat appear rather rich yellow and the body light greyish blue. When shot and more closely examined the fluffy fur looks pale lead-grey with a rather strong greenish tinge. The wings of the dead animal discolour soon.

Nycteris hispida (SCHREBER).

DOBSON: Cat. of Chiroptera B. M. p. 162.

A specimen of this kind was caught at Njoro, north of Guaso Nyiri in the thornbush country ¹⁸ 1911. It appeared to be common there and was seen flying at sunrise and sundown among the palms fringing a dry river bed.

On the acacia steppe on the southern side of Guaso Nyiri small Bats were seen flying after dusk but as I could not secure any specimens I do not know which species they represented but refer to G. M. ALLEN's paper quoted above in which several Bats from the same district are mentioned.

Insectivora.

Erinaceidae.

Erinaceus hindei THOMAS.

THOMAS: Ann. & Mag. Nat. Hist. 1910 Ser. 8, Vol. V.

Remains of Hedgehogs in the shape of the dry skin of their bodies were a very common thing in the thornbush north of Guaso Nyiri, but I did not see any living specimens. They were probably sleeping over the dry season. The skins found were undoubtedly remains of such specimens which had killed and eaten by some foe, either Jackals, or perhaps more probably *Bubo lacteus*.

As it was impossible to determine such remains without a rich material for comparison I took the liberty of sending a specimen to British Museum, and had the pleasure of receiving a reply from Mr. G. DOLLMAN, in which he informed me that it was quite similar to *Erinaceus hindei* THOMAS. This species was originally described from Kitui and Machakos but afterwards also collected at Guaso Nyiri. It is according to THOMAS «closely allied to *E. albiventris*» of northern Africa.

Macroscelidæ.

Elephantulus pulcher rendilis n. sp.

The specimens of «Jumping Shrews» collected north of Guaso Nyiri in the thornbush appear to be closely related to *E. pulcher* THOMAS.¹ The small differences will be discussed further below.

To judge from the locality and considering other components of the fauna of the thornbush I almost expected to meet there some of the somewhat more northern forms, but the following comparison with the descriptions prove this to be excluded, even if there is a great affinity to some of them. *E. boranusi*² THOMAS differs in having «basal halves of belly-hairs dark slaty; line of demarcation indistinct». In the present specimens the hairs of the lower side of the body are entirely white, although towards the sides near the line of demarcation grey, and finally slaty, basal parts appear, but even there not by far extending half way up the hair; the line of demarcation is sharp. *E. boranusi* is also apparently more richly coloured above as THOMAS speaks about its back being «a deeper chestnut» — — —.

The Abyssinian *E. peasei* THOMAS³ is larger than the present specimens («hind foot s. u. 35»; «Greatest length of skull 38») and «the bases of the hair everywhere slaty grey», and the white of the lower surface not sharply defined.

E. somaliensis THOMAS⁴ is said to be similar to *E. peasei* but paler in colour. In this respect as well as in the somewhat smaller dimensions it appears to approach my specimens, but the slaty bases of the belly-hairs give a distinguishing characteristic.

E. dundasi DOLLMAN⁵ from Lake Baringo has also slate grey bases to the belly-hairs, rather longer nasals and longer upper tooth-row.

E. phoenus HELLER⁶ from Sotik has «hair every where dark slate at base». Its skull appears to be longer but its upper tooth-row comparatively shorter than in my specimens.

E. revoili HUET⁷ from Somaliland appears to have larger hind foot (40 mm.), and longer tooth-row (20 mm) in addition to its different colour.

E. delicatus DOLLMAN⁸ quite recently described from «Orr Valley, Mt. Nyiro», is said to have «underparts white, hairs almost white to roots, the extreme bases of the hairs alone being greyish». In this respect the race mentioned resembles my specimens more than the others do. But *E. delicatus* has a longer skull (37 mm.), longer nasals (15 mm.), longer palate etc.

¹ Ann. & Mag. Nat. Hist. Ser. 6. Vol. XIII p. 69.

² Proc. Zool. Soc. London 1900. p. 802.

³ Ann. & Mag. Ser. 7 Vol. VIII. p. 154.

⁴ L. c. p. 255.

⁵ Ann. & Mag. Nat. Hist. Ser. 8 Vol. V.

⁶ Smithsonian. Misc. Coll. Washington 1910. Vol. 56 n:o 15 p. 8.

⁷ Mission Revolu aux Pays Comalis, Faune et Flore. Mamm. 1882 p. 5.

⁸ Ann. & Mag. Nat. Hist. Ser. 8. Vol. VIII.

It is quite probable that several of these forms are closely related and only ought to be regarded as geographic races or subspecies. Considering my own specimens I think it most suitable to regard them as a subspecies of *E. pulcher* with which they agree in the general pattern of eye-markings and dimensions of skull. The latter fact is fully proven by comparing the measurements of THOMAS' type-specimen, which was female, with the corresponding ones of a female skull in my collection (conf. below).

General colour of back rather light brown, produced by buff thinly overlaid with black tips to the hairs. Sides of body much paler and more greyish, resembling pale ceru (Rép. des couleurs 66,4) with scattered black hair which hardly alter the colour. Behind the ears a buff-coloured patch without black. Forehead coloured like the back but a little paler and more greyish gradually merging into the pale yellowish grey of the sides of the snout. A narrow dark mesial streak extends along the proboscis where it is blackish, up on the back of the snout, where it is umber brown, but disappears before it reaches the level of the eye in the brownish of the forehead. A white ring round the eye extending backwards to below the ear. The postero-inferior mark, which interrupts the white ring, is fawn-coloured, in some specimens a little mixed with black (nearly black in *E. pulcher*). Sometimes this dark mark is continued all around the white eye-ring as a fawn-coloured band, sometimes this is less sharply pronounced. Below the postero-inferior dark eye-marking the colour of the flanks extends nearly to the gape. Lips, chin and the entire under side white with sharp line of demarcation. The hairs of the upper parts and flanks are dark slaty basally, but the white hairs of the lower parts are entirely white, except perhaps those nearest the line of demarcation toward the flanks (conf. above). Hands and feet white. Tail brown above, whitish below.

	♂	♀
Greatest length of skull	35,0 mm.	33,7 mm.
Condylolncisive length	33,2 »	31,7 »
Greatest breadth	20,0 »	20,0 »
Length of nasals	13,6 »	12,1 »
Interorbital width	6,5 »	6,0 »
Length of upper tooth row . . .	18,1 »	17,2 »
Length of head and body about .	12,0 cm.	

The maximum length of the tail is 13 cm. in a male, but in females it appears to be shorter, about 11 cm. Hind foot s. u. about 31,5 mm. in males, a little less in some females. The gland in the sternal region is well conspicuous.

As can be seen from this description the most important differences between the typical *E. pulcher* and my specimens is that the former has the bases of the hairs of the under surface grey and the «postero-inferior interruption» of the white ring around the eye (nearly black). These differences are evidently only of subspecific value. Without access to material. I cannot say if or how many of the other races in the adjoining countries deserve the rank of species. It appears almost pro-

bable as mentioned above that at least some of them could be joined with others as subspecies. HELLER says for instance about his species *E. phaus* that it is closely allied to *pulcher*.

I obtained 5 specimens of the race described above in the thornbush country north of Guaso Nyiri, partly not far from a waterplace called Thera, partly below Chanler Falls. These specimens were all of them secured with the shotgun while running through the bushes. In spite of their large eyes which give them the appearance of being nocturnal in habits, these animals are seen moving about in full daylight under a glaring sun. Only single specimens were seen. When scared they ran through the bushes to all appearance like a mouse, and I did not see them deserve the name »Jumping Shrew». They were not very shy and did as a rule not run very long each time.

Soricidæ.

Sylvisorex sorelloides LÖNNBERG.

LÖNNBERG: Ann. & Mag. Nat. Hist. Ser. 8 Vol. IX p. 67.

This very interesting long-tailed Shrew was caught on the acacia-steppe near Itiolu river, a tributary to Guaso Nyiri from its southern side. With regard to its very long and almost rat-like tail and general proportions it appears to resemble *S. sorella* THOMAS¹ described from the Masuku Plateau, Nyasaland. It differs by this characteristic very markedly as well from *S. lunaris* THOMAS and *S. granti* THOMAS from Ruwenzori, as from *S. mundus* OSGOOD from Kijabe, which all have the tail shorter than, or at the most subequal with the length of head and body.

The general colour above is dark brown (Pl. III fig. 1). The fur is rather long (about 5 mm.) and soft but not very dense. It is dark plumbeous basally with long brown tips, something between raw umber (n:o 301) and brownish drab (n:o 302, Répert. de Coul.), somewhat paler more greyish on the flanks. The lower side is whitish by long white tips to the hair which are plumbeous grey basally. The line of demarcation between the colours of the upper and lower sides is not very sharply defined. Hands and feet very slender, hairy. Fingers whitish except the fifth and the lateral side of the fourth which are brown. The corresponding parts of the hands as well are whitish resp. brown. On the hind limbs only the two inner toes and the corresponding parts of the feet are light. The tail is very long and slender, quite murine in appearance, scaly and annelated, but at the same time covered with a great number of short hair, which, however, do not conceal the annulation. The tail is brown above and distinctly paler below. It has no longer bristles at all.

The snout of the freshly caught animal was strikingly long and slender, almost cylindrical in shape and almost cleft at the end. The vibrissæ are numerous.

¹ Proc. Zool. Soc. London 1897 p. 930.

The lateral musk-glands are strongly developed and emit even in the dried state of the skin a quite strong odour of musk.

Length of head and body of the dry specimen about 67 mm.; length of tail 84 mm.; length of hindfoot resp. 15 mm. without, 16 mm. with claws.

Condylar-incisive length of skull 18.4 mm. The greatest breadth of the skull cannot be ascertained because it is partly broken on the right side behind, but it is probably about 8 mm. Interorbital width 4.3 mm., palate length to gnathion 7.5 mm., length of maxillary series of teeth 8 mm.

The anterior incisors have the posterior cusp pointed but not very high, not reaching half the height of the anterior margin of the succeeding tooth. First unicuspid rather large and sharply pointed. The second unicuspid does not reach half the height of the first, and it is also a little lower than the third. The third overlaps the second so that, if the teeth are seen from the coronal surface, the latter tooth looks smaller than it really is. But if seen from the lateral side it shows its real dimensions better and proves to be as well much higher as even broader than the fourth. The latter is much the smallest in the series, and it does not reach more than half the height of the third unicuspid.

The relative size of the second and fourth unicuspids as described above forms an important distinguishing characteristic from *Sylvisorex sorella* THOMAS with which this species, no doubt, is closely related. In *S. sorella* the second unicuspid evidently is much smaller than in the present species as it is said¹ to be subequal with the fourth, and both are only about half the height of the third, while in the present species there is as much difference in height between the fourth and the second unicuspid as between the second and the third.

The last upper molar of *S. sorella* is said to be of 'squarish form'. In this species it is more triangular than square in outline.

The long-tailed Shrew from Liberia which MILLER has named *Myosorex muricauda*,² but which THOMAS placed in the genus *Sylvisorex* when creating this,³ differs decidedly from the present species in having only 3 unicuspid teeth in the upper jaw, and in having no 'trace of scales or annulation' on the tail. The latter organ is also shorter than in *S. sorella* and *sorelloides*.

Crocidura martiensseni NEUMANN.

NEUMANN: Zool. Jahrb. Abth. Syst. Bd. 6, 1900 p. 544.

A specimen of Giant Shrew was caught ²⁸/₁ 1911 in the Meru country not far outside the forests of north-eastern Kenia. The dimensions of this specimen are as follows viz. head and body (dry specimen) 136 mm., tail 89 mm., and hind feet about 23 mm. with claws, 21 without claws. These measurements agree rather

¹ Proc. Zool. Soc. London 1897 p. 931.

² Proc. Acad. Washington 1900, Vol. II p. 645.

³ Proc. Zool. Soc. London 1904 Vol. II p. 190.

closely with NEUMANN's short communication about *Crocidura martiensseni* from Usambara and Kilimanjaro. The same is also the case with the dark brown colouration.

NEUMANN has, however, not given any cranial measurements of his type, and I have therefore written to Professor MATSCHIE and asked for information, and the result of his kind communication is recorded below for comparison with my specimen.

	Kenia spec.	Type according to MATSCHIE.
Condyllo-incisive length	32,1 mm.	33,3 mm.
Greatest breadth of skull . . .	13,2 »	13,2 »
Interorbital breadth	5,9 »	5,9 »
Length of maxillary series of teeth	14,6 »	15,1 »

Concerning the colour of *C. martiensseni* which NEUMANN shortly has stated to be »dunkelbraun» MATSCHIE kindly has communicated the following which is of value as it gives information for the future about the appearance of this Giant Shrew. »*Cr. martiensseni* ist auf der Oberseite gleich der Terre d'Ombrie brûlée, umbra gebrannt Taf. 304 n:o 2, und auf der Unterseite dunkelgrau, stark umbrabraun (Taf. 304,1) überflogen. — — — Alle Haarspitzen der Unterseite, oder vielmehr die obere Hälfte jedes Haares, sind hell umbrabraun, die Wurzelhälfte grau.»

This description suits my specimen quite well except that it is darker above, closer to darkest sample of burnt umber (Rép. de Couleurs) 304 n:o 4 than to n:o 2. This may, however, be of less importance. The Usambara specimen has also a little longer skull and dental series as can be seen from the measurements recorded above but other cranial dimensions are alike. For the present it is impossible to say whether these small discrepancies in colour and length of skull is of racial importance. I hardly believe that, and prefer to name my specimen as above.

Crocidura flavescens nyansa NEUMANN (l. c. p. 544) is »dull cinnamon-coloured» and thus still paler. *C. doriana* appears also to be paler as DOBSON¹ terms it »light reddish brown above» and it is also smaller.

The lateral gland of my specimen is well developed and is situated nearer to the groin than to the axilla.

Crocidura fumosa THOMAS.

THOMAS: Ann. & Mag. Nat. Hist. 1904, Ser. 7 Vol. XIV p. 238.

Specimens of the Dusky Shrew were collected at several localities as at Blue Post, Kagio, Embu boma, the native village Kanyakeni south of Meru boma, and at the latter place in the more or less cultivated country, but also in the lower forest-

¹ Ann. Mus. Civico Genova 1887, Ser. 2:a, Vol. IV p. 565.

region on the eastern slopes of Kenia. It is thus perhaps the most common Shrew in the district mentioned.

It has also been found on Kilimanjaro, and a subspecies is described by THOMAS from Ruwenzori.

Crocidura turba DOLLMAN.

DOLLMAN: Ann. & Mag. Nat. Hist. Ser. 8 Vol. V. p. 176.

This Shrew was collected as well on the acacia steppe south of Guaso Nyiri and at Luazomela and Lekiuundu rivers as on Kenia in the forest at an altitude of 2450 m. It is thus a rather common species. DOLLMAN has kindly compared some of my specimens with the type specimen of *C. turba* and a long series of *turba* which recently has been received in British Museum from East Africa, and he has stated the correctness of my determination.

C. turba resembles *C. monax* but the great number of long hair on the tail of the former makes it easy to recognize from the latter, in which the tail is »almost bristleless» according to THOMAS.

Crocidura hindei THOMAS.

THOMAS: Ann. & Mag. Nat. Hist. 1904 Ser. 7 Vol. XIV p. 237.

A specimen of this Shrew was trapped at Juja farm ¹⁹/₁ 1911.

Crocidura hildegardæ THOMAS.

THOMAS: Ann. & Mag. Nat. Hist. 1904, Ser. 7. Vol. XIV p. 240.

A specimen of this small Shrew was caught at a native village Kazere one days march from Meru boma at the base of Kenia ²⁵/₃, and another at the village of Kutu south of Embu boma ²⁴/₁ 1911. This latter place is not very far north of the type locality, Fort Hall. A third specimen from Blue Post (²¹/₁), south of Fort Hall, is a little less brown, and the lateral gland is more pronounced. I felt therefore rather uncertain about its identity but Mr. GUY DOLLMAN has kindly after comparison ascertained this.

Carnivora.

Canidae.

Canis mesomelas SCHREBER.

DE WINTON: Proc. Zool. Soc. London, 1899 p. 539.

North of Guaso Nyiri this Jackal was evidently common in the thornbush country. The specimens which I saw in Febr. and March had remarkably bright colours, the rufous of the hindquarters and flanks appeared especially clear when they ran away through the bushes.

I had expected to find a small race of the Black-backed Jackal in this country because NOACK has described¹ from Somaliland a small variety which he has called *Canis mesomelas schmidti*. This was, however, not the case. The specimens which I saw were not small. The females are smaller than the males, but a young adult female measured from snout to vent 72 cm., and the tail was 34 cm. without hair.

In the accompanying table of measurements the dimensions of 9 skulls of *Canis mesomelas* from different parts of Africa² have been recorded. From this

	"Caffraria" Natal ♂ (♀)		Damaraland ♂ (old)		Damaraland ♀		Ba-Kuena, Brit. Bechuanaland		Leitokiot, Kiliman- jaro. Germ. E. Afr. ♀		N. of Guaso Nyiri Brit. E. Afr. ♀		Gheleba, Eritrea ♀		Type of <i>C. mesome- las schmidti</i>		B. E. A. ♀		South Sotik ♂		Leikipia ♂ (quoted from ALLEN)		Leikipia ♂ (quoted from ALLEN)		Average of six spec- imens of different sexes according to ALLEN		
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Maximum length of skull	165	165	149	156	152	147	150	—	150	150	153	143	—	148,4													
Basiscranial length of skull	150	150	137	144	137	137,5	136	129	137	138	—	—	—	—													
Zygomatic width " "	85	86	81	83,5	86	83	87	79	84	83	87	82	—	84,6													
Greatest width of brain-case	54	52	51	51	52	53	54	49	51	51	—	—	—	—													
Greatest length of nasals	64	70	56	64	54	51	51	42	51	53	—	—	—	—													
Distance from hind margin of m ² to front surface of i ¹	88	89	81	85	81	80	79	—	79	79	—	—	—	—													
Distance from orbit to tip of premaxillary	71	72	64	69	62	61	61	—	60	62	—	—	—	—													
Least interorbital breadth	28	30	28	27,3	27,5	30	28	—	28,5	26	29	29	—	29,3													
Distance between tips of postorbital processus	44,5	47	44	44	43	46	46	—	44	43	—	—	—	—													
Length of p ⁴	18	—	16,5	17,3	16,5	17	16,5	—	17	17	16,3	15	—	15,8													
" " m ¹ laterally	12,3	—	11,3	12,2	11,9	11,9	11,4	—	11,2	11,1	—	—	—	—													

the superior size of the males in South Africa is quite apparent. On the other hand it is plainly seen that the female skulls from Damaraland, Kilimanjaro, Sotik, the Guaso Nyiri district, and Eritrea agree very closely in size so that there cannot be based any racial difference on the size as far as the Black-backed Jackals of these

¹ Zool. Anz. Bd. XX. 1897, p. 519.

² I am indebted to Mr. R. J. CUNNINGHAME for two skulls from South Sotik.

³ This skull has been obtained from Rev. Mr. K. G. RODÉN.

countries are concerned. J. A. ALLEN has communicated¹ measurements of 6 skulls from Leikipia, Brit. East Africa. These agree also with the measurements of the material of this museum. DE WINTON mentions (l. c. p. 540) that he has observed that specimens from south of the Zambesi — — are rather larger, and the facial part of the skull appears slightly longer in proportion than those obtained from the north of that river. The measurements of the present material do not support this except for southern males. It must, however, be borne in mind that male members of the genus *Canis* often vary a great deal, and some specimens may be bigger than the average. As I only have one male skull from East Africa, and that one is not very old, I cannot say whether the southern males of this species generally are larger in size or not. The measurements of NOACK's type specimen of *C. mesomelas schmidtii* are of course decidedly smaller than the corresponding ones of any of the *mesomelas* skulls in this museum, even than those of females from Eritrea, and the Guaso Nyiri district. In consequence of this it must be assumed either that *C. mesomelas schmidtii* is a race with very restricted habitat in Somaliland, or that the type specimen to which this name was given was a dwarfed individual.

NOACK has also indicated that his *C. mesomelas schmidtii* differs from the typical race with regard to the dentition. This difference is said (l. c. p. 620) to consist therein that in *C. m. schmidtii* no lateral cusps (Nebenzacken-) are to be found on pm^2 and pm^3 which is said to be the case in the true *C. mesomelas*. This is, however, a very variable characteristic. The small cusps are sometimes present sometimes absent even in southern specimens. In the specimen from Guaso Nyiri the additional cusp of pm^3 is very well developed. In a similar way pm^4 of *C. m. schmidtii* is said to have only one lateral cusp, while there are two in the true *C. mesomelas*. The latter is the case in all my material.

With regard to colour I cannot find any important differences between specimens from Eritrea and Guaso Nyiri on one side, and those from Damaraland on the other, except that the former perhaps are a little brighter, and that in the latter the dark line below the eye is only faintly developed, whereas it is distinct in the northern specimens. The presence of this dark line in specimens of this Jackal from the Cape Colony has been stated by DE WINTON (l. c. 540), and as mentioned above it can be traced in specimens from Damaraland. There are thus new and more constant characteristic needed before any distinction can be made between the East resp. Northeast-African Black-backed Jackals and the South-African ones.² The type of *C. mesomelas schmidtii* NOACK is excluded from this, but more material of the same kind is evidently needed before the racial distinctness of *C. mesomelas schmidtii* can be said to be fully proved when there are larger and typical Black-backed Jackals to be found as well in Eritrea as in the country north of Guaso Nyiri.

¹ Bull. American Museum XXVI p. 172. New York 1909.

² O. NEUMANN has recorded the Black-backed Jackal of East Africa as »*Canis mesomelas schmidtii* NOACK» (Zool. Jahrb. Bd. 13, 1900, p. 550) without giving any reason for doing so.

Canis adustus SUNDEVALL.*Canis lateralis* SCLATER — DE WINTON, Proc. Zool. Soc. London 1899, p. 541.*Canis adustus* SUNDEVALL — LÖNNBERG, Mammals p. 14 in Sjöstedt's Kilimanjaro-Meru Expedition. Uppsala 1908.

In the steppe country round Nairobi this species appeared to be common and it was hunted there with hounds. I had the pleasure of receiving from Mr. SETH-SMITH a skull from Ruiru river. A skull was also picked up by Mr. A. JANSSEN near the road between Embu boma and Kutu.

The basiscranial length of SUNDEVALL's types of *Canis adustus* is 154 mm. in the male and 144 mm. in the female.

In a female specimen from Nairobi the same measurement is 147 mm., in another from Ruiru river 146 mm. and in the picked up skull which is fully adult but young 140 mm. The skulls agree in other respects as well with that of the female type.

We did not with certainty observe this Jackal further north than at the place where the skull was picked up, as mentioned above.

Jackals were seen at a distance on the acacia steppe south of Guaso Nyiri and also heard barking there during the nights, but I had no opportunity of stating whether they belonged to this species or possibly to *C. variegatus*.

Otocyon megalotis virgatus MILLER.

GERRIT S. MILLER: Smithsonian. Misc. Coll. 1909, Vol. 52, Pt. 4, No 1883, p. 485.

A male specimen from the Athi plains agrees with MILLER's description. The teeth are also smaller than those of the southern *O. megalotis* but hardly in such a high degree as it will appear from CABRERA's measurements,¹ because the dimensions of the teeth are rather variable in these animals. The transversal diameter for instance of m^1 is in the present specimen 6.7 mm., of m^2 6.5 (6.7) mm. and of m^3 6.2 mm., and these measurements are even larger than the corresponding ones of a female of *O. megalotis* from 'Caffraria', but smaller than those of a male from the latter locality. This characteristic thus holds good only if specimens of the same sex are compared. If this is done the difference in other dimensions as well is prominent. The distance from the orbit to the tip of the premaxillary is in the southern male specimen 50 mm. but only 46 in the northern, an so on. Considering all, however, I hardly think that the East African race deserves higher rank than that of a geographic subspecies.

¹ Ann. & Mag. Nat. Hist. 1910, Ser. 8, Vol. VI, p. 463.

Hyænidæ.

Crocotta panganensis LÖNNBERG.

LÖNNBERG: Mammals p. 18, in SJÖSTEDT's Kilimandjaro Meru Exp. 1908.

We had bad luck with Spotted Hyenas because our steel-traps were too weak, and they wrenched themselves free again. But after my return home Mr. R. J. CUNNINGHAME kindly sent me a skull of a male Spotted Hyena from South Sotik, British East Afrika. The skin had unfortunately been lost. This skull proves to be of the broad type, according to CABRERA's¹ division of the species, the breadth across the upper carnassials being even greater than the length of the lower tooth-row exclusive of incisors. The ratio between zygomatic breadth and condyloincisive length is 72 %. The palatal opening is very broad (conf. table of measurements below).

It is of course difficult to base the identification of a Spotted Hyena on a skull only but this skull resembles rather closely that of the type of *C. panganensis*.² Most of the small differences may be explained as individual variation or as due to difference in age. The upper carnassial tooth of the skull from the Sotik is considerably smaller than that of the type of *C. panganensis*, but a young cotype of the latter has almost as small carnassial.

Basal length of skull	223 mm.
Condyloincisive length	238 »
Greatest zygomatic breadth	172 »
Least interorbital width	53 »
Distance between upper ends of <i>foramina infraorbitalia</i>	57 »
Least postorbital width of skull	40 »
Width of palatal opening at <i>sutura palatopterygoidea</i>	30 »
Distance between outer sides of outer upper incisors	36 »
Distance between the <i>bullæ</i> at the foramen at the middle of the inner side	28 »
Breadth across upper carnassials ³	107 »
Length of upper carnassial	34 »
Length of p ¹	21 »
Length of lower carnassial	26 »
Length of upper tooth row exclusive of incisors	97,5 »
Length of lower tooth row exclusive of incisors	104 »

¹ Proc. Zool. Soc. London 1910, p. 95.

² I take this opportunity to correct an unfortunate misprint in my paper quoted above. In the table of measurements l. c. p. 19 is written »Basilar length of skull 249 mm.», shall be 229 mm.

³ This measurement corresponds to that of the type of *C. panganensis*, but that quoted in the table of measurements of this species (l. c. p. 19) »distance between upper carnassial teeth at their posterior end 91,3 mm.», is another measurement taken as quoted at the extreme ends of these teeth!

***Hyæna schillingsi* MATSCHIE.**

MATSCHIE: Sitzber. naturf. Freunde. Berlin 1900, p. 55.

A specimen of Striped Hyena from the Kedong Valley procured for comparisons sake from Mr. KLEIN at Nairobi agrees perfectly as well in colour as in pattern with MATSCHIE's description of the type and with a specimen from the Kilimanjaro district. Especially the two broad stripes over the hind quarters is a good distinguishing characteristic from the following race. The type locality of this species is the plains around Kilimanjaro but it is evidently widely distributed over the Masai steppe, while the following race takes its place further north.

***Hyæna schillingsi rendilis* LÖNNBERG.**

LÖNNBERG: Ann. & Mag. Nat. Hist. Ser. 8, Vol. IX, p. 64.

With regard to the dimensions of the skull this Hyena closely resembles the Striped Hyena of the Kilimanjaro district named *Hyæna schillingsi* MATSCHIE.¹ The width of the palatal opening between the *suture palatopterygoidea* is even somewhat narrower (conf. the accompanying table of measurements) than in *H. schillingsi* and *H. hienomelas bergeri* MATSCHIE in which two races this measurement is narrower than in all other described races of Striped Hyenas, in which it at least amounts to 21 mm. according to MATSCHIE.² *H. hienomelas bergeri* differs from this new race in the same points as from *H. schillingsi* viz. by greater interorbital breadth, greater length of the posterior portion of the head, and the direction of the postorbital processes as set forth by the author quoted.

The dimensions of two skulls of *H. s. rendilis* are recorded in the accompanying table of measurements together with those of a typical *H. schillingsi* from Kilimanjaro.

	<i>Hyæna</i> from north of Guaso Nyiri		<i>Hyæna schillingsi</i> from Kili- manjaro
	♂	♀	
	mm.	mm.	mm.
Greatest length of skull	234	197	228
Basiscranial length	200	173	195
Zygomatic breadth of skull	148,5	117	144
Least interorbital breadth	48,5	38	44,5
Least breadth of skull behind postorbital processes	38	36	34
Greatest breadth of skull in the occipital region	81	73	70
Breadth of skull across canines	50	45	51
Breadth of skull across anterior lateral cusp of p ⁴	83	73	83
Distance between bullæ at <i>foramina lacera media</i>	22,5	22	21

¹ Sitzber. Naturf. Fr. Berlin 1900, p. 55.² ibidem Berlin 1910, p. 365.

	<i>Hyena</i> from north of Guaso Nyiri		<i>Hyena schillingsi</i> from Kili- manjaro
	♂	♀	
	mm.	mm.	mm.
Distance between <i>foramina infraorbitalia</i>	46	41,5	47
Width of palatal opening at <i>sut. palatopterygoidea</i>	17,5	16,5	18
Breadth of both nasals in front	22	20	20,5
Distance from posterior palatal margin mesially to end of <i>proc. pterygoideus</i>	44	38	47
Distance from posterior palatal margin to <i>foramen magnum</i> mesially	89	75	89
Length of palate	105	94	101
Length of p ⁴	30	30	30

It is chiefly with regard to its colouration that this *Hyena* differs from its relative at Kilimanjaro. It is generally of a much paler hue. The snout is less dark, and the forehead is pure grey without any such brownish tint as in *H. schillingsi*. The sides of the neck from below the ears and backwards are almost pure white. The black longitudinal stripe on either side of the mane on the upper neck, which is strongly developed in *H. schillingsi*, is much less conspicuous in the new race and is not continuous but more or less broken up in a series of short streaks. The mane itself is very much lighter than in *H. schillingsi*, in which the general colour of the mane, when not erected, is dark brown which is produced by the long blackish brown tips and the brown rings on the individual hairs. In this race again the dark, brown tips do not by far cover the pale brownish to whitish ground colour. The single hairs of the mane are coloured in such a way that the base is almost white for about 4–5 cm., then follows a 5–7 cm. broad zone of very pale brownish, then again 2–3 cm. whitish and finally the dark maroon brown tips 4–6 cm. but in consequence of the great thinness of the latter compared with the middle and basal portions of the hairs they do not cover much with their dark colour. A probably important difference from *H. schillingsi* is that in the latter there are often, if not always, several short brown rings alternating with pale in the middle portion of the hair, while in the present race as described above it is only one broad and much paler brownish ring. The tail of the new race is very pale because the dark tips of the hairs are very short and give hardly any impression of dark colour except at the apical end, and the general colour of the hair is buffish white. The general colour of the sides of the body is whitish. The black stripes over the shoulders and hind quarters are decidedly narrower than in *H. schillingsi*. The same is also the case with the transverse stripes on the flanks, although they perhaps stand out more boldly in consequence of the lightness of the ground colour. In *H. schillingsi* there are two broad black stripes running from the dorsal crest down over the hind quarters, but in the present race there are three such stripes, although much narrower. The middle one of these stripes is less strongly marked than the anterior and posterior. The stripes on the sides of the body are not very sharply defined but have a certain tendency to join to a network or dissolve into spots. The stripes across the legs

are not so strongly marked as in *H. schillingsi* and are, especially in the older specimen, more broken up into spots. The ground colour of the legs is paler than in *H. schillingsi*. The hind legs of the older specimen is pale ashy grey without any brownish tint in strong contrast to a *H. schillingsi* of similar age. The feet are pale earth brown. The chin is blackish and the large black patch on the under side of the neck is also present but the interspace between these two areas is light hoary grey, not brownish grey as in *H. schillingsi*.

From this description may be seen that almost every part of the body is differently coloured to the corresponding part of *H. schillingsi*, and sometimes the pattern as well is somewhat different. This difference is of course not very deep-going, but on the other hand sufficient to prove the existence of a separate geographic race. Only two specimens have been at my disposal but as one of them is a young adult female and the other a male, and both are closely alike I think the reliability of the description is warranted by this.

The specimens mentioned were caught in the thornbush country north of Guaso Nyiri where Striped Hyenas appeared to be rather common but by no means easy to catch.

In Nairobi I had the opportunity of seeing three skulls of *Proteles* from »Northern Guaso Nyiri» but unfortunately we had no opportunity of securing any specimens ourselves.

Viverridæ.

Genetta dongolana HEMPR. & EHRENB.

HEMPRICHT & EHRENBURG: Symb. Phys. 1832, I, 2.

When reviewing the Genets in the year 1902 MATSCHIE¹ divided the species with shaggy tail and black marks on the hind legs in two groups one with »Sohlen der Vorderfüsse schwarz», and the other with »Sohlen der Vorderfüsse nur wenig dunkler als deren Oberseite». In either of these groups one species from North Eastern Africa is recorded viz. in the latter the Nubian Genet, *Genetta dongolana* HEMPR. & EHRENB., and in the former a »Weissfüssige Genette, *G. spec. von Harar in Nordostafrika*». The latter was shortly afterwards named »*G. hararensis*» by NEUMANN² who, however, did not add anything of value to MATSCHIE's notes in his »key». In the »Zoology of Egypt» by ANDERSON and DE WINTON a Genet from Suakin is carefully described under the name of »*Genetta dongolana* HEMPR. & EHRENB.»³ but this specimen is said to have »the under surface of the fore feet black». By

¹ Verh. d. V. Internat. Zoologenkongress. Nachtr., p. 1128—1144. Berlin 1902.

² Sitzber. Naturf. Freunde. Berlin 1902, p. 183.

³ L. c. Mammalia, p. 188.

this statement it is made probable that the specimen from Suakin belongs to the same race as the type specimen of *G. hararensis*. This is the more probable as I have obtained from a somewhat intermediate locality viz. Gheleb in Eritrea two specimens of Genets with shaggy tail and extensive black markings on the hind legs, collected by Rev. Mr. K. G. RODÉN, which have the under surface of the fore feet quite black in one, and blackish in the other. Then remains the question whether these specimens can be referred to *G. dongolana* HEMPR. & EHRENB. or if *G. hararensis* constitutes a constant geographic subspecies distributed along the coast districts of the Red Sea. More than a subspecies it certainly cannot be. MATSCHIE has undoubtedly had access to the type of *G. dongolana* HEMPR. & EHRENB., and it must therefore be assumed that this type has »Sohlen der Vorderfüsse nur wenig dunkler als deren Oberseite». The question is then whether this characteristic is constant or not. That the degree of darkness is variable is already proved by the two Genets from Gheleb, Eritrea as mentioned above. It is still more proved by two Genets of this group caught by this Expedition in the dry thornbush country north of Guaso Nyiri below Chanler Falls. They were trapped from the same camp resp. ¹² and ¹³ 1911, and both are adult males. In one of these the under side of the fore feet is quite black on the outer side becoming gradually blackish grey and lighter grey towards the inner side and the tip of the middle finger. In the other specimen there is a black stripe along the outer side of the under surface of the fore feet but the hair around the pads of the finger tips are quite light.

It appears thus probable that in one and the same race of Genet the lower surface of the fore feet can be black or blackish in some specimens, and hardly darker than the upper surface in some other specimens.

According to MATSCHIE there are also some differences with regard to the pattern of the tail-marks between *G. dongolana*, and *G. hararensis*. The former is said to have 10 dark rings, and the light rings in front of the tail-tip are broader than the dark ones (MATSCHIE l. c. p. 1140), whereas the type of *hararensis* has 8 dark rings and the light rings in front of the tail-tip narrower than the dark ones (l. c. 1139). The Genet from Suakin described in the »Zoology of Egypt» is said to have eight black bars alternating with broad pale areas — but the artist has represented it on the plate with 10 black rings and the white rings broader than the black. The tail on the plate is thus of true *dongolana*-type according to MATSCHIE, the description has too small number of black rings.

The two Genets from Gheleb, Eritrea, have both of them 10 dark rings, although the last in one is rather slightly developed. In one of them all light rings are broader than the dark except that the second black ring from the tip is somewhat shorter than the light ring behind it. In the other specimen the second, third, and fourth black rings from the tip are a little shorter or narrower than the light rings behind them respectively, otherwise the light rings are broader than the dark.

In one of the specimens from Guaso Nyiri the black rings are narrower than the white except that the fourth ring from the end is somewhat narrower than the white behind it. In the other specimen from the same place the second black ring

from the end is decidedly longer than the white ring behind it, the third, and fourth black rings are subequal with, or a little broader than the white rings behind them, otherwise the white rings are broader than the black.

From these facts it appears evident that the relative dimensions of the black and white rings are not constant in these Genets, and consequently no specific characteristics can be based on them.

The type of *G. hararensis* is said to have »Hinterseite des Unterarms dunkelgrau mit hellen Haarspitzen«, while *G. dongolana* shall have »Hinterseite des Unterarms fast so hell wie die Vorderseite« (MATSCHIE l. c. p. 1139).

ANDERSON'S Genet from Suakin is said to have »the outer posterior surface of the fore limbs more or less black, with greyish hairs intermixed«.

This is exactly the case with one of the specimens from Eritrea, in the other the posterior side of the fore limbs is not quite so dark.

In one of the specimens from Guaso Nyiri the hind surface of the fore limbs is darker than the front-side, although not so dark as in the paler of the Eritrea specimens. In the other specimen from Guaso Nyiri there is no perceptible difference in colour between the front- and hind-surface of the fore limbs. This characteristic is accordingly variable as well.

Under such circumstances it appears impossible to distinguish with certainty any different geographic races of this group of Genets from North Eastern Africa until much richer material has been obtained.

It must, however, be remarked that NEUMANN has added still more to the confusion by creating still another name¹ *Genetta guardafuensis* for a Genet from Eastern Somaliland, and as usual he has not given any description still less any measurements of the animal or its skull. He has simply stated that this so called species is »sehr ähnlich der *Genetta felina* THUNB. vom Cap aber durch kleinere und rötliche — bei jener stets schwarze — Fleckung unterschieden«. This cannot be called a description,² especially when the subject belongs to such difficult genus as *Genetta*. To judge from the locality it might be possible that this *G. guardafuensis* belongs to the same geographic race as the Genet from Guaso Nyiri if it really is a separate race. If the statement of NEUMANN, however, that *G. guardafuensis* is quite similar to *G. felina* in other respects than the single characteristic mentioned, is correct *G. guardafuensis* should have the posterior surface of the fore limbs black and then it would differ from the Guaso Nyiri Genet.

The only thing NEUMANN has added to MATSCHIE'S notes on *G. hararensis* is that he terms the hind surface of the fore limbs »black« (»schwarze Färbung«) while MATSCHIE used the word »dunkelgrau«, and that he says that this Genet possesses a »schwarzen Mittelfleck« on the chin. Such a black spot on the chin is not present

¹ l. c. p. 183.

² Everybody who has worked with East African mammals has often been confronted with the difficulty to guess what NEUMANN has meant with the numerous names he has so abundantly published, as a rule, with very insufficient and unsatisfactory descriptions, hardly ever with cranial measurements. Such things are very annoying and the knowledge about the fauna is certainly not promoted by such superficial proceedings.

in the Genets from Eritrea nor in the specimens from Guaso Nyiri. The latter have, however, the lower lips dark, and in one of them the whole chin has a dark shade. It is thus possible that this chin mark is not a constant characteristic.

Considering all I think the best thing for the present is to regard the Genets from Guaso Nyiri as belonging to the species *Genetta dongolana*. In such details as has not been already discussed they agree very well with the description published in 'Zoology of Egypt' except that the five narrow rufous lines on the back of the neck are not so sharply defined, and much mixed with black tips to the hair.

The ground colour of the body is greyish white and the spots are rufous buff mixed with black. Five longitudinal series of spots can be discerned, the two uppermost of which have a tendency to become more or less confluent into stripes. The black crest is sharply defined, the length of its hair is about 5 cm., and twice as long as the other hair.

To prove the resemblance with regard to the cranial dimensions the measurements of the Suakin specimen recorded in 'Zoology of Egypt' have been quoted side by side with the corresponding ones of the Guaso Nyiri specimens of this collection in the following table of measurements.

	Anderson's specimen from Suakin	Specimens from Guaso Nyiri, B. E. A., below Chanler Falls	
		♂ ¹	♂
	mm.	mm.	mm.
Condylobasal length of skull	—	—	85,5
Basal length	81	—	81,3
Zygomatic breadth	43	43,7	46
Palatal length	40	44,4	41,8
Breadth between tips of p ¹	9,5	10	11,6
Breadth outside p ⁴	26	28	27,5
Narrowest interorbital breadth	12,7	14	13,5
Breadth of braincase	30	29,3	28,8
Length of nasals (middle line)	15,3	18,8	15,6
Outside length of p ⁴	9,5	8,6	9

On the whole these skulls agree pretty well but the variability is proved to be rather great as is seen from the differences between the two male skulls from Guaso Nyiri for instance with regard to the length of the nasals. The difference in the length of the palate (2,6 mm.) in the two skulls from Guaso Nyiri is chiefly due to the difference in length of the skulls themselves. The length of palate is a little more than half the length of the skull, and if the difference in basal length of the skulls is about 4 or 5 mm., 2,6 mm. is only a natural difference in the palatal dimensions.

¹ This skull is between 4 and 5 mm. longer than the other from Guaso Nyiri but it is a little broken posteriorly so that the exact basiscranial length cannot be recorded.

The skulls of the specimens from Eritrea are similar to those measured as above, but being both females they are a little smaller.

Genetta suahelica MATSCHIE.

MATSCHIE: Verh. d. V. Internat. Zool. Kongr. Nachtr., p. 1143.

A specimen trapped at Meru boma ¹/₂ 1911 agrees quite closely with specimens collected at Kilimanjaro but is rather small. The specimens from Kilimanjaro vary a great deal in size, and the specimen from Meru boma is similar to the smaller of them.

Two young Genet kittens bought from the natives at Meru boma belong presumably to this species as well. We tried to raise these young animals but did not succeed. They could not eat even finely chopped meat, because they had no teeth, although they had a length of head and body amounting to about 23 cm. (= tail 17 cm.), and a basiscranial length of 45 mm.

I have also seen specimens from Kismayu evidently belonging to this species.

Genetta stuhlmanni MATSCHIE.

MATSCHIE: Verh. d. V. Internat. Zool. Kongr. Nachtr., p. 1142.

A Genet trapped in bush at Embu boma ²⁶/₁, and another caught just within the edge of the primeval forest on the eastern slopes of Kenia ²⁷/₁ near a small river Kitwai, one days march from Embu boma belong to the same species and, as far as I can make out, to the one named as above.

The black spots which partly have a rufescent tinge in the middle are arranged in four longitudinal series. The spots in the upper three series are larger than those in the fourth. The dorsal stripe is intensely black and well developed from behind the shoulders and backwards. Eight light rings on the tail can be traced, at least on the lower side, but the outer 3 or 4 tend to become obsolete so that a considerable portion of the tail appears black. The fore legs and the frontside of the hind legs have about the same colour as the body, but the posterior surface of the hind legs are brownish black.

These Genets are rather small, and have much smaller skulls than *Genetta suahelica*. The nasals are also shorter as the following measurements indicate, but on the other hand the interorbital region is broader than in *G. suahelica*. For comparison with the latter the comparatively small specimen from Meru boma has been used.

	<i>Genetta suahelica</i> from Meru boma	<i>Genetta stuhlmanni</i>	
		Skull from Embu boma	Skull from E. Kenia ♂
	mm.	mm.	mm.
Condylobasal length	87,5	80,5	80,5
Basiscranial length	82	76	76
Zygomatic breadth	41	44,5	40
Interorbital breadth	11	13	11,7
Length of nasals mesially	17,3	14	15
Front of canine to back of m ²	32,5	30,9	31,1
Longest diameter of p ⁴	8,3	8,4	8,5
Length of palate to gnathion	41,5	—	38,3

The name *Genetta stuhlmanni* has been based by MATSCHKE on material from Bukoba, and Mengo in Uganda. The skull has not been described, as far as I know, and the description (l. c.) is not very detailed, but I think that the identification above is correct. It is then of interest to see that a Genet which geographically belongs to the Central Lake district extends its distribution to the eastern slopes of Kenia and there meets the more eastern *G. suahelica*, and this zoogeographical fact is in accordance with several others in other groups of animals as well.

***Mungos sanguineus rendilis* n. subsp.**

It is connected with a considerable difficulty to ascertain to which race a specimen of small African Mongoose with black tail-tip belongs in consequence of the great variability of these animals. Some years ago a synopsis of this *Herpestes gracilis* group was worked out by WROUGHTON.¹ In this the author quoted recognizes 6 species, and a number of subspecies which are divided in two groups according to size as expressed by the length of the hind foot. The next subdivisions are based on the shape of the skull and the colour. Now it appeared comparatively easy to use this key, but in certain instances difficulties arise. This is for example the case with the small Mongooses from the thornbush-country north of Guaso Nyiri. The length of the hind feet in the male specimens from this locality is about 56—57 mm. (without claws) which ought to refer them rather to the larger *M. sanguineus* group, but in adult (even old) females from the same locality the same dimension is only between 51 and 52 mm. (without claws). This measurement agrees thus nearer with the corresponding one of the *M. ochraceus* group. In addition to this the brain case as well of male as female skulls from the locality mentioned is rather strongly inflated anteriorly, and the postorbital constriction is sudden. The skulls resemble thus in this respect the *M. ochraceus* group according to WROUGHTON. As a conclusion of these facts it must be admitted that the limits between the *M. ochraceus*

¹ Ann. & Mag. Nat. Hist. 1907, Ser. 7, Vol. XX, p. 110.

and the *M. sanguineus* groups are not very sharp. The race which is to be described now, as it cannot be identified with any known form, appears to be intermediate, and its subspecific name is added to the species name *sanguineus* which is much older than *ochraceus*.

Upper parts of the whole animal grizzled, the hair being broadly annulated with buffish white, sometimes more inclining to ochraceous, and dark brown to blackish. The annulation of the hair tends to produce about 2 mm. broad, somewhat wavy, blackish transverse stripes which are visible on the posterior two thirds of the body, and sometimes as far forward as above the shoulders. The pale bands between these look broader than the black in consequence of the arrangement of the hair, although on the single hairs the dark rings are broader than the light. The hairs are about 13—15 mm. on the anterior, 15—17 mm. on the posterior parts of the back, single hairs being somewhat longer. Each hair has three alternating light and dark rings, the base being light, and the tip dark. The head is more finely, and the tail more coarsely grizzled. The hair of the latter has 4 or 5 pale rings the last of which often reaches the tip. The legs are grizzled, but the fingers are more or less uniform buff. The lower side is different in different specimens. A fully adult but not old male is uniform rather rufous buff all over the lower surface and on the inside of the hind legs, but the chin and lower neck is somewhat grizzled separated by a uniformly buff-coloured patch on the throat. In another male and a female, both old, the whole of the lower neck is grizzled, and the middle of the thoracic region is also grizzled. The ventral region and the inside of the legs which are uniformly coloured are dull buff. The general arrangement of the grizzled areas is similar to these latter specimens in a young male but the colour is still duller, pale greyish buff. The black tip to the tail is longest in the old male, about 13 cm. to the tip of the hairs, in the others it is only 7 cm. The hair of the tail is from 30 to 40 mm. The dimensions of the four specimens show some variability especially with regard to the length of the tail:

♂ old	length of head and body about	27½ cm.	of tail without hair	32 cm.
♂ adult	» » » » »	28½	» » » » »	33½
♀ old	» » » » »	29	» » » » »	24
♂ young	» » » » »	27	» » » » »	26½

	Old skulls with the nasal sutures obliterated (conf. Pl. II, fig. 3)	
	mm.	mm.
Condylbasal length of skull	64	61
Basiscranial length	61,5	57,5
Zygomatic breadth	33	29,5
Distance between outer sides of p ⁴ posteriorly	20,8	19,8
Distance from frontside of c to hindsurface of m ¹	22,2	21,6
Greatest diameter of p ⁴	7,1	7,2
Greatest diameter of m ¹	6	5,8
Least interorbital breadth	12,6	11,4
Least breadth at postorbital constriction	8,5	10

This Mongoose is probably nearly related to *M. s. ibea* but it is smaller, the length of the hind foot of the latter being 60 mm., to maximum 57 mm. in the present subspecies. With regard to the colour the Mongoose from the thornbush country north of Guaso Nyiri evidently is paler than its relative in the Kikuyu country. The skull is also smaller in the present subspecies than in *M. s. ibea*.

Perhaps there is also a close relationship between this Mongoose and *M. s. gracilis*, but the latter has a larger hind foot, longer tail and smaller skull. The colour is perfectly different as well. There is in these specimens from Guaso Nyiri no likeness whatever in colour with RÜPPELL's figure of *Herpestes gracilis*,¹ nor can they be termed »gelbgrau» (RÜPPELL l. c. p. 29), nor »pinkish drab» (WROUGHTON l. c. p. 111 & 116).

In spite of these differences there is no doubt that *gracilis*, *ibea* and the present specimens only represent geographical modifications of the same animal. This Mongoose was rather common in the thornbush along the northern bank of Guaso Nyiri below Chanler Falls.

Just south of Fort Hall in a place where high grass grew on both sides of the road I saw during the march at four different opportunities small Mongooses run across the road beyond range for the shotgun. As Fort Hall is the type locality of *Mungos gracilis ibea* WROUGHTON there can be no doubt that these animals belonged to the species mentioned which accordingly must be common there. A couple of times a glimpse of similar animals was seen in shambas near Kutu and at some other localities.

***Mungos sanguineus orestes* HELLER.**

HELLER: Smiths. Misc. Coll. Vol. 56 No 17 p. 15. Washington 1911.

A specimen closely agreeing with HELLER's description of the type specimen from Kenia of this Mongoose was caught at Meru boma ¹/₂ 1911. The measurements of the skull as well agree with those recorded for the type.

With regard to the shape of the anteriorly swollen braincase this Mongoose appears to be perhaps more nearly related to the *ochraceus*-group, although it is of large size, but all these Mongooses with black-tipped tail may most suitably be regarded as geographic races of one and the same type.

The type-locality of *M. s. orestes* is the »west slope of Mt. Kenia, altitude 8,500 feet». It was thus of interest to find it at Meru boma viz. at the northeastern corner of the forest region the centre of which is Mount Kenia. It forms thus evidently a race adapted to these dark forests with their greater humidity which explains the melanistic tendency in its coloration.

Its nearest relative may be *M. s. proteus* THOMAS from Ruwenzori which also is a dark Forest Mongoose.

¹ Taf. 8 fig. 2 in »Neue Wirbeltiere zu der Fauna von Abyssinien gehörig». Frankfurt a. M. 1835.

Mungos paludinosus conf. mitis THOMAS & WROUGHTON.

THOMAS: Proc. Zool. Soc. London 1902 p. 309.

A specimen from Nairobi has a dark rufous general colour produced by tan-coloured (Rép. de Couleurs 317.2) rings and tips to the black hairs. The feet are black.

With regard to the colour this specimen is rather similar to some specimens of *M. p. robustus* from Kilimanjaro, but with regard to cranial characteristics especially the smallness of the teeth and the bulla it approaches more closely to the Abyssinian *M. p. mitis* described by THOMAS 1902. This is proved by the following measurements:

	Nairobi ♂	<i>M. p. mitis</i> (THOMAS)
	mm.	mm.
Basal length of skull	93	95
Condylolncisive length	100	100
Zygomatic breadth	57	62,5
Interorbital breadth	20	21
Breadth of braincase	38,5	38
Mastoid breadth	40	40,5
Palate length from gnathion	57,5	56
Breadth of posterior palate	9 ¹	8
Greatest horizontal diameter of p. ⁴	11,6	10,8
» » » » m. ¹	9,5	9,1
» » » » m. ²	6	5,8
» » » » p ₄	8	7,5
» » » » m ₁	9,2	8,6
» » » » m ₂	6	5,9

The corresponding measurements of the teeth of a *M. p. robustus* from Kilimanjaro are:

p ⁴	12,4 mm.	p ₄	8,2 mm.
m. ¹	11,0 "	m ₁	10,0 "
m. ²	6,8 "	m ₂	6,7 "

It is thus especially the molars which are much smaller than in *M. p. robustus* and agree with those of *M. p. mitis*.

As characteristic of the latter THOMAS has stated that the bullæ are much lower and less prominent than in the former. In the present specimen the distance in a straight line from the bony ledge above the bulla and to the middle of its ventral surface is about 11 mm., but in a specimen of *M. p. robustus* from Kilimanjaro it is about 14 mm. It appears thus as if this specimen in this respect as well

¹ The posterior palatal surface is only 7,3 mm. broad.

should agree with *M. p. mitis*, and it is probably a connecting link between the latter and *M. p. robustus*. More can hardly be said for the present when only one specimen is available.

Ichneumia albicaudus ibeanus THOMAS.

THOMAS: Ann. & Mag. Nat. Hist. 1904 Ser. 7, Vol. XIII, p. 409.

The White-tailed Mongoose appeared to be not uncommon round Nairobi. It was often trapped in the section inhabited by hindoos and natives. I saw several living specimens in captivity. An immature male was obtained from Kikuyu.

Helogale hirtula ahlSELLI LÖNNBERG.

LÖNNBERG: Ann. & Mag. Nat. Hist. Ser. 8, Vol. IX, p. 64.

Body and tail all over coarsely grizzled with ochre yellow, sometimes more buff, and black producing an olive brown general colouration. The yellowish sub-terminal rings about 3 mm. (Pl. V fig. 1). Head very dark grey produced by a fine whitish sprinkling on black ground colour, head and back are thus very differently coloured. Lower parts grizzled like the upper parts but duller, thus assuming a more brownish general tint. In two specimens out of three the fingers and toes tend to become pure black, in the third they are grizzled like the other parts. The extreme tip of the tail is sometimes more or less uniform rufous buff. The length of the hair of the back is generally 12–14 mm. but single hairs become 18 mm. or more. The not visible underfur is buffish. Length of head and body 250–260 mm. length of tail 180 to 200 mm. length of hind foot 54–56 mm. with claws, without 48–50 mm. (skin measurements). One specimen measured in flesh had head and body about 24 cm. and the tail about 18 cm.

	♂	♂
	mm.	mm.
Condylobasal length of skull	52,5	52,8
Basiscranial length	49	49
Zygomatic breadth	33,3	32,2
Interorbital breadth	12,9	12,1
Greatest width of brancase above mentus audit.	24	23
Length of palate	27,5	26,3
Greatest diameter of p ⁴	6,1	6,4
" " m ²	4,5	4,5
Front of canine to back of m ²	18,8	18,5
Breadth between outer corners of p ⁴	19,5	19,5

There is no real cusp on the inner side of p^4 . The transversal diameter of m_1 is about 2.8 mm. its length is about 4 mm. The shape of the skull is shown on Pl. II figs 4 and 5.

In the year 1902 OLDFIELD THOMAS¹ reviewed the then known species of *Helogale*. According to this review and later on printed descriptions the hitherto known races differ from the one described above in the following points.

Helogale undulata PETERS is a much more rufous animal especially with rufous face, and »subtus undique rufus» as PETERS says.² The feet are also rufous. A pointed interior cusp to p^3 is present. *Helogale atkinsoni* THOMAS has »face, crown and back uniformly grizzled grey. (»Finely ticked«.) Under surface dull greyish brown. Feet grizzled greyish proximally, fulvous on digits». It appears to be smaller than the present species the basal length of the skull being 41.5 mm. greatest diameter of p^4 5.1 mm.; breadth between outer corners of p^4 16 mm.³ Length of hind foot 41 mm. *Helogale victorina* THOMAS is »pale grizzled grey suffused with ochraceous yellow. Muzzle fulvous. Crown like back. Under surface from chin to anus dull buffy yellow, hands and feet also buffy yellow.» Tail buffy below. Greatest diameter of p^4 5.6 mm.⁴ *Helogale varia* THOMAS »General colour above finely speckled yellowish or buffy grey passing gradually below into deep buffy without speckling.» »A small patch on each side of muzzle running back to surround the eye brown or brownish rufous.» »Greatest diameter of p^4 5.2 mm.⁵ *Helogale hirtula* THOMAS. Hairs on the back 18—20 mm. General colour as in *H. atkinsoni* but more coarsely grizzled. Head and back appear, however, to be of the same colour to judge from the description. The rings of the hair said to be »white». »Under surface as in *H. atkinsoni* except that the belly has a more strongly marked tendency to rufous.»⁶ Diameter of p^4 5.9 mm.

Helogale macmillani THOMAS »General colour above between broccoli brown and Mars brown» — — »finely ticked with minute buffy specks» — — — »less than 1 mm. in length». »Under surface near Prout's brown with scarcely any speckling.» — »Upper surface of hands russet.» »Front of canine to back of m^2 15.6 mm.⁷

Helogale parrula (SUNDEVAL). The small South African species is so much smaller and darker and geographically so distant from the present species that no nearer comparison between them is needed, neither with the allied *H. brunnea* THOMAS & SCHWANN from Transvaal which latter is uniform brown finely ticked with buffy whitish.

It may be quite clear from this review that the *Helogale* described above differs from all other species of this genus hitherto described. In spite, however, of the differences such as the general colour, the great length of the fur, the rufous-

¹ Proc. Zool. Soc. London 1902 p. 119.

² Reise nach Mossambique. Zool. Säugeth. p. 114.

³ Ann. & Mag. Nat. Hist. Ser. 6, Vol. 20, 1897, p. 378—379.

⁴ Proc. Zool. Soc. London 1902 p. 120.

⁵ L. c. p. 119.

⁶ Ann. & Mag. Nat. Hist. Ser. 7, Vol. XIV, p. 98.

⁷ Ann. & Mag. Nat. Hist. Ser. 7, Vol. XVIII, p. 300.

ness of the lower side etc. in *H. hirtula*, it is probably the nearest ally of this race, and I prefer to regard the present form as a subspecies of *H. hirtula*, which I name *H. h. ahlseili* for my friend Mr. RUDOLF AHLSELL who kindly and generously has assisted my expedition to Brit. East Africa.

The characteristics common to both *H. hirtula* and the new race are the following: the large size of the teeth in which the new race is superior even to *H. hirtula*; the presence of black hair at the claws, even if this is not quite constant; scantiness of the hair around the eye.

H. hirtula has been described from *Gabridehari, 60 miles west of Gerlogobi*, Somaliland. This is rather far to the northeast from the place where this new race has been found, viz. in the thornbush country north of Guaso Nyiri at Njoro (about 1° N. lat.), and below Chanler Falls.

H. hirtula ahlseili is a rather common animal in that country. It lives in holes in the ground and takes also often its refuge into old termite hills. It appears to live in small colonies, and more than once I observed such a colony to my great astonishment in the same place where a colony of Ground Squirrels had their burrows. When running the *Helogale* looks, if seen from some distance, rather like a dark Ground Squirrel. They sit also sometimes upright on the haunches as such. As soon as danger approaches the animals disappear at once in their holes, and even wounded specimens are apt to reach the burrows, if not killed on the spot. I succeeded in shooting three old males.

Since the above was written THOMAS has described three more species and subspecies of *Helogale*.¹ Of these *H. retula* from Lamu is *finely grizzled grey* and much smaller. *Hind foot 44 mm. *H. percivali* has the head between burnt umber and vandyke-brown* which is completely different from the present race. It is also smaller. *H. hirtula lutescens* from Lake Rudolf is perhaps the closest relative to the present but it is somewhat smaller and appears also to differ in colour to judge from the description.

Felidae.

Felis leo sabakiensis LÖNNBERG.

LÖNNBERG: Mammals in: Sjöstedts Kilimandjaro-Meru Expedition Upsala 1908, p. 22.

After having examined skulls of Lions obtained at Nairobi HOLLISTER has arrived to the conclusions² that they represented the same race which the present author a few years ago described from the Kilimanjaro district. Not having had any opportunity of shooting Lions near Nairobi I cannot add anything to HOLLISTER's communication except that I can confirm his statement about the variability of the colour of these animals as I saw several skins brought in to Nairobi. The amount of black in the mane of the males varies for instance a great deal.

¹ Ann. & Mag. Nat. Hist. Ser. 8, Vol. VIII, p. 724—725.

² Smithsonian Misc. Coll. Vol. 56 no 2. Washington 1910, p. 11.

When speaking about Lions Dr. S. L. HINDE, Provincial Commissioner in Mombasa, told me that these animals on the Athi plains formerly were much more diurnal in their habits than they are now. It was then a common sight to see Lions move about, and even catch their prey in broad daylight. The black in the mane of a crouching Lion resembled the scattered black stones on these plains.

Lions are still rather common on the plains and come sometimes rather close to Nairobi, where a gentleman was severely mauled by a Lioness last winter 1910-11. Several such accidents happen every year and end not seldom with the death of the victim. As His Excellency, Governor JACKSON told me the Lion hardly ever kills a man outright on the spot, even if the wounds afterwards prove fatal. Lionesses with small cubs may attack without provocation, otherwise it is only wounded animals, and such as have been pursued by hunters mounted on horseback and find that they cannot escape that become dangerous. It is the rule in British East Africa that a wounded Lion charges furiously, but there are exceptions even from that rule. One of the last days of my stay in Nairobi I heard from the Game Warden Mr. WOOSNAM that he had the day before pursued a wounded Lion in a papyrus-thicket¹, but it tried to escape until the last moment. When not wounded the Lions as a rule try to escape as quietly as Jackals as I observed a couple of times myself.

When there is abundance of big game the Lions do not often attack cattle. That they appear to be especially fond of Ostrich meat has been mentioned in my paper on the birds collected by this Expedition.

On the acacia steppe near Itiolu river I saw $5\frac{1}{2}$ the remains of a fullgrown Oryx on which 5 Lions (2 females and 3 grown up cubs) had fed. These remains consisted of the head, the vertebral column with short stumps of the ribs, the pelvis, 3 of the legs, and pieces of the lungs. The ears and the nasal cartilages (as well as the cartilages of other parts) were completely gnawed away. The skin was also eaten except a big piece on the forehead. 65 paces from the place where these remains were found the Oryx had been killed, and there the missing foreleg had been left together with the stomach. It appears as if the Lions always use to remove the stomach and intestines of the prey soon after it is killed, and scratch sand and earth over them if the ground is such that it can be done. This has been observed by others as well as by myself. Sometimes the Lion appears to condescend to prey on rather small animals. On the southern side of Guaso Nyiri I found one day the remains of a Porcupine which my experienced gumbearer said had been killed and eaten by a »Simba».

How far north the distribution of this race extends I cannot say, but it is probable that it inhabits the steppe country even to the northeast of Kenia. A Lioness shot by Mr. A. SJÖGREN near Itiolu river, a tributary from the south to Guaso Nyiri measured in total length 244 cm. 83 cm. of which was the length of the tail.

Lions are not uncommon on the acacia steppe south of Guaso Nyiri.

¹ A proceeding which is almost beyond the limits of bravery even for an experienced sportsman!

Felis leo somaliensis NOACK.

NOACK: Mitt. Naturhist. Mus. Hamburg IX Jahrg. 1891, p. 48.

North of Guaso Nyiri in the thornbush country I had the opportunity of shooting a male Lion with rather strongly worn incisors ¹¹/₃ 1911. This specimen belongs evidently to the Somali-race. Its general colour is pale yellowish grey, whitish below. The lips and chin are whitish. There is a whitish spot above and below the eye. Most of the whiskers are pure white but some of the smaller on the upper lip are black. With the exception of the parts mentioned the face is sprinkled with dark brown. The mane is short the hair averaging about 10 cm., and it does not extend backwards beyond the neck. It is pale buff around the ears and on the sides of the fore-neck, forming a blackish brown crest along the upper neck and shading into dull brown on the sides of the hind neck. Along the back is a fine sprinkling of black, and on the posterior surface of the lower hams a blackish ill-defined streak. There are no spots except some few small ones on the inside of the hind legs. On the feet a few indistinct whitish stripes are seen. The tail is more sprinkled with black on the upper side than the back, and this increases to the short black tuft.

The length of head and body of this Lion was about 180 cm. measured in a straight line, and the tail without hair 82 cm. These measurements agree nearly with those recorded by MATSCHIE.

The dimensions of the skull are as follows:

Maximum length of skull	336 mm.
Condylbasal length	308 "
Basal length	287,5 "
Zygomatic breadth	218 "
Interorbital breadth	72,5 "
Least postorbital width	61 "
Width of palatal opening at <i>sut. palatopterygoidea</i>	32 "
Distance between bullae in front	28 "
tips of postorbital processes	98,3 "
Length of p ⁴	35 "

The Somali Lion is perhaps the smallest race of its kind, and it may therefore be of interest to compare its skull with that of the largest race of Lion, *F. leo capensis* (FISCH), and for this purpose I have selected a fine male specimen shot by the famous Swedish explorer J. F. WAHLBERG in 'Caffraria interiore' 1845. The maximum length of this skull is 395 mm., its condylbasal length 340 mm. and its basal length 321 mm. Already by comparing these measurements with those above the remarkable difference in size is clearly understood, and also that the occipital crest extends further backwards beyond the condyles in the South African Lion (55 mm.) than in the Somali Lion (28 mm.) Even in male skulls of *F. leo sabakiensis*, which I saw in Nairobi, the occipital crest appeared more developed than in *F. leo*

somaliensis. If the occipital crests are not counted in, the difference in length between the South African and the Somali skull is 32 cm. (viz. the difference between their condylobasal measurements). The zygomatic breadth of the South African is 251 mm. The difference with regard to this dimension is thus about equal to the difference in condylobasal length. The interorbital breadth, on the other hand, is in spite of other dimensions even a little smaller in the South African (71.5 mm.) than in the Somali Lion, but the least postorbital width is larger in the former viz. 68 mm. The same is also the case with the width of the palatal opening at *sutura palatopterygoidea* viz. 40 mm., and the distance between the bulke in front viz. 31 mm., although in a smaller degree in the latter case. The distance between the tips of the postorbital processes is 112 mm. in the South African Lion, thus larger than in the other, and naturally enough this is also the case with the length of p^4 which amounts to 40 mm.

The nasals are very different in the two races, those of the South African Lion being much longer measuring mesially 102 mm. against 80 mm. in the Somali animal. The greatest combined breadth of the nasals in front is resp. 71 mm. and 59 mm.

The length of the lower jaw from the back of the condyle to the anterior surface at the symphysis is in the South African Lion 257 mm., and in the Somali Lion 231 mm.

The former has thus more powerful jaws and in connection with this a stronger musculature which again has caused a stronger development of crests and bones on which these muscles are inserted.

The Somali Lion is apparently a «Bush-Lion» and this may account for the scantiness of its mane (Pl. VI fig. 1), such an ornament being decidedly not useful for an animal living in thick bush as it must get entangled in the thorns and twigs. The bush does not offer such an abundance of big game as the open plains, and this is perhaps the explanation of the inferior size of this race. It is, however, bold enough to prey even on big animals if it gets an opportunity. One day when we were camping at Guaso Nyiri below Chanler Falls one of our native gunbearers reported that he had found the remains of a female Giraffe which had apparently been killed by Lions when it came down to the river to drink. This seemed very strange and I went to the spot the following day. The remains consisted, however, then only of the skull and the picked bones left by the Hyenas and Vultures so that it was impossible to find out anything about how the animal had been killed. It is possible that the Lion(s) had sprung on the Giraffe when it stooped to drink, and it may be possible that it was sick or had been wounded before. The male specimen which I shot had a remarkably big belly and was much infested with ticks of the species *Rhipicephalus armatus*. It was nevertheless in very good condition and contained a great deal of fat which is highly appreciated by the natives.

The carcase of a Rhinoceros is sure to attract the Lions, and this is known to some sportsmen much to the injury of the Rhinos!

It was said that the «Bush-Lion» which lived on the mainland opposite Mombasa, in the thick bush there, was mane-less. It is thus possible that the Somali Lion extends its distribution as far southwards in the districts covered with thick bush.

Felis pardus LIN.

Unfortunately there was very little opportunity during the whole expedition to gain any direct knowledge about the Leopards of British East Africa, although these animals are by no means uncommon. No specimen was shot. Only once I saw with my own eyes a Leopard, and then I had no weapon. This happened in the thornbush country near the water place Njoro north of Guaso Nyiri ²⁴ 1911. Mr CUNNINGHAME and I were returning to the camp in the afternoon, and we were walking along a game path. CUNNINGHAME went a few steps in front of me and had already passed the thornbush from which the Leopard jumped out, hardly two metres from the path on which we were going. My gunbearer had unfortunately stopped behind for a moment, and the animal thus disappeared with long leaps unmolested as CUNNINGHAME unfortunately missed with snap shot. I had only time to state that it was a large specimen with a rich rufous colouring, although one could have expected to find a pale form in this arid country.

The characteristic hoarse growling sound with intervals (somewhat similar to that produced «by sawing a piece of thin wood with a coarse toothed saw» as Pocock says)¹ was heard during the nights now and then at Njoro and on the acacia steppe at Lekindu river.

In the forests of Kenia as well the Leopards are common. I heard from an Englishman who had a grant to collect rubber on the eastern slopes of Kenia, that the Leopards within short time had snatched away three dogs from him. In other places as well I heard similar accounts proving how fond the Leopards are of dog-meat.

It is generally believed that there are two kinds of Leopards in British East Africa a large and a small race. It is also spoken about a small-spotted and a large-spotted race. Although I have not got material to express a definite opinion I think it must be observed that the difference in size partly can be explained by the great difference between the sexes, the males being much larger than the females. The condylobasal length of an old male Leopard from Gheleb, Eritrea (received from Rev. K. G. RODÉN) is, for instance, 192 mm. while the same measurement in females from the same locality (also received from the same gentleman) is from 167 to 175 mm. Partly the difference in size also may be due to the greater or less abundance of food. The Provincial Commissioner Dr. HINDE has drawn my attention to the fact that according to his experience the Leopards in the forests and at the edge of the forests were larger than those of the open plains, and he regarded this to be due to the greater quantity of food which was available to the former than to the latter.

¹ Proc. Zool. Soc. London 1907 p. 677.

As regards the pattern it is a fact that as well small-spotted as large-spotted Leopards occur in Brit. East Africa. I have seen skins of both kinds there, and



Fig. 2. A large-spotted Leopard from Brit. East Africa.

the Swedish ethnographer K. G. LINDBLOM, Phil. Cand., has sent home four skins with both patterns. It is difficult to form any opinion concerning the value of these two patterns. The large skins appear to have larger spots than the small skins.

Thus the big male specimen from Eritrea mentioned above has larger spots than the smaller females without, however, directly deserving the name «large-spotted». The large-spotted skins (conf. Fig. 2) sent home by LINDBLOM are larger than the



Fig. 3. A small-spotted Leopard from Brit. East Africa.

small-spotted ones (Fig. 3). The number of the spots counted transversely at the middle of the body appears to be about equal in both. The size of the spots may accordingly in East African Leopards stand in connection with the size of the animal only and thus be without value as a racial characteristic.

A skin of a Leopard from Kismayu sent home by Rev. Mr. ENGBAHL is comparatively small and has small spots.

In a similar way as the spots are different in size in Leopards from the same country the ground colour as well is found to be very variable. In a skin from Machakos the ground colour of the back is (perhaps a little more rufous than) tan (Rép. des Couleurs 317,¹) fading gradually down to yellowish buff (Rép. des Couleurs 310,²) on the lower flanks while the centre of the rosettes even there is bistre (Rép. des Couleurs 328,¹). In another skin of a similar pattern, and which looks quite fresh (not faded), also from Brit. East Africa and probably from no distant locality as it also has been sent home by Mr. LINDBLOM, the darkest ground colour of the back is yellowish buff (Rép. des Couleurs 310,²) fading to creamy white on the flanks where the centre of the rosettes is pale yellowish buff (Rép. des Couleurs 310,¹). The difference between these two skins is thus very striking, and the individual variation very great.

The four skins from Eritrea are less rufous than the most bright-coloured from British East Africa but not so pale as the palest from there.

As it is difficult to decide whether there is one or two varieties of Leopards in East Africa it is uncertain what name is to be applied to East African Leopards. Following MATSCHIE I have once called¹ a Leopard from Kilimanjaro *Felis pardus nimr* (HEMPR. & EHRENB.). This was, however, a mistake as the name *nimr* originally had been given to a much paler animal which is said to have been — — — *flavescente albida, dorso medio levius fulvescente, ocellis e macularum nigrarum quaternarum quinarumve annulis in medio tantum corpore notata, areolis annulorum fulvescentibus* — — —. The coloured plate in HEMPRICHT & EHRENBURG's *Symbolae Physicae* show a Leopard *Ex Arabia felici* and it is much paler even than the palest specimens from Eritrea and the palest from East Africa. I suppose therefore that the name *nimr* cannot be used for any African Leopard.

In the year 1900 O. NEUMANN created a new name *Felis leopardus suahelicus*,² because *die grossgefleckte ostafrikanische Form des Leoparden hatte bisher noch keinen Namen* (!). Not a single word of description is added, and such a proceeding of naming an animal without any diagnose ought to be repudiated. The difficulty of finding out what this *F. l. suahelicus* is meant to be is the greater as no certain type locality is indicated but four different places are enumerated so widely distant as Tanga and Uganda. It is thus no wonder that LYDEKKER when figuring³ the skin of a large-spotted Leopard from Uganda is quite uncertain whether it is identical with *suahelicus*, or not. LYDEKKER's specimen proves to have an unusually short tail. From Ruwenzori CAMERANO has described a large-spotted Leopard and given it the name of *F. p. ruwenzori*. This one has a short tail, and if this characteristic proves constant LYDEKKER's specimen may be counted to this race. From

¹ Wiss. Ergebn. d. Schwed. Zool. Exp. Kilimandjaro-Meru 1905—1906 unter Leitung von Prof. Dr. YNGVE SJÖSTEDT. 2. Mammals, p. 23.

² Zool. Jahrb. Abth. Syst., Bd. 13, Hft. 6, p. 551.

³ Proc. Zool. Soc. London 1907, p. 784.

my material, however, it will appear as if the big large-spotted skins had a comparatively short tail independent of from which locality they have originated. Thus if the tail is laid forward along the middle of the back it reaches with the tip to above the shoulders as well in the big and comparatively large-spotted skin from Eritrea as in the two big and large-spotted skins from British East Africa. On the other hand in the smaller and small-spotted skins the tail is, as a rule, longer and when laid as above it reaches usually further forward with the tip to the middle of the upper neck, but there are exceptions from this rule so that in some small-spotted specimens as well the tail is comparatively short.

From this discussion it is apparent that the question about eventually two races of Leopards in British East Africa cannot be solved for the present. More material is needed and especially material with indication of sex and age. It is of course then also impossible to say now which subspecific name ought to be applied to this or these Leopards.

The small Leopard of Somaliland has been called *F. p. nanopardus* by THOMAS.¹ The flat skin of the type specimen, an old female, is only 1070 mm. and none of my skins is so small, nor is there any with so short tail as 580 mm. as that of the female *nanopardus*.

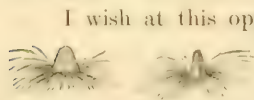


Fig 4. The spur at the tip of the tail of an East African Leopard. a dorsal view; b from the right side. Three times enlarged.

I wish at this opportunity to draw attention to the fact that it is very easy to ascertain whether the tail of a Leopard is complete or intact at the tip, because every such tail is provided with a spur or nail at the extreme end, homologous with that at the end of a Lions tail about which so much has been spoken (conf. Fig. 4 a & b).

Felis capensis hindei WROUGHTON.

WROUGHTON: Ann. & Mag. Nat. Hist., Ser. 8, Vol. V, p. 205.

A specimen from the bush steppe near Thika river and not far from Blue Post appears to agree with WROUGHTON's description of this race of Serval. The present specimen is, however, a little longer, head and body measuring about 84 cm, and its tail is somewhat shorter, about 26 cm. without hair. But as it is a female its skull is not large, and the measurements of the same agree with those recorded by WROUGHTON.

¹ Ann. & Mag. Nat. Hist. 1904, Ser. 7, Vol. XIV, p. 94.

	♀ from Thika river	Wroughton's specimen ♂ ¹
	mm.	mm.
Greatest length of skull	114	120
Basilar length	95.5	97
Zygomatic breadth	76	81
Combined length of p ³ and p ⁴	20	22
Length of upper carnassial	13	13
Breadth of upper carnassial	5	6
Length of lower molar	9.5	9.5
Length of bullæ	2.2	2.3

A skull of a male Serval from Natal in this museum has larger dimensions even than WROUGHTON's type specimen of the present race. The basicranial length of the Natal specimen is about 107 mm., zygomatic breadth 88 mm., combined length of p³ and p⁴ 23 mm., length of bullæ 27 mm. The last dimension is the most striking.

WROUGHTON's type was from Machakos, Brit. East Africa, but other specimens are recorded in Brit. Museum from Aberdare Range. The place where the present specimen was collected is situated some distance north of the type locality. The range of the subspecies extends, however, also southwards to the Kilimanjaro district which is proved by a skin obtained by SJÖSTEDT from natives in that country and which displays the same general pattern of colouration as the specimen from Thika river.

The latter specimen was observed in the forenoon ²⁰1 1911 skulking through long grass but was betrayed by its long ears visible above the grass. Mr. A. SJÖGREN and I started to go on either side of it so as to intercept it, and the former got the opportunity of shooting it.

The geographical distribution of the different races of Serval are imperfectly known as yet. The following contribution to the knowledge of this may therefore deserve to be published. Some short time ago I had the pleasure of receiving from Mr. A. SANDBERG a skin and a skull of a female Serval obtained near Pweto (Mpueto) in Belgian Congo at the northern end of Lake Mweru. This Serval agrees with regard to colour and pattern very closely with *Felis capensis beira* WROUGHTON¹ from Beira, Portuguese East Africa. The skull as well as the teeth are smaller than the corresponding parts of the type of *F. c. beira* as the following comparison indicates but this is possibly due to difference in sex.

¹ Described in the same paper as *F. c. hindei*.

	WROUGHTON'S type of <i>F. c. beirae</i>	SANDBERG'S female specimen from Pweto
	mm.	mm.
Greatest length of skull	128	118
Basilar length	108	99,5
Zygomatic breadth	91	74,5
Combined length of p ³ and p ⁴	26	23,5
Length and breadth of upper carnassial	16 × 8	14,5 × 6,8
Length of lower molar	12,3	11,7
Bulge	26,5	25,2

As the differences between the sexes of *F. c. hindei* are not so great (conf. above) as between these skulls referred to *F. c. beirae* it is possible that when more material is available the Serval of Pweto will prove to be a small-headed and small-toothed subspecies of its own, although very closely allied to *F. c. beirae*. The interesting thing is, however, that a small-spotted and pale Serval occupies a district, Beira-Lake Mweru, which separates the native country of the large-spotted *F. c. hindei* (Brit. and Germ. E. Afr.) from the South African home of *F. c. capensis*, which also is comparatively large-spotted.

***Felis ocreata* Gmelin subsp.?**

At Juja farm when looking for small birds I saw one evening a Wild Cat in rather high grass but owing to the small shot in my gun I failed to kill it. Mrs. Mc MILLAN told me that the wild Cats interbred with the domesticated Cats at Juja farm.

A glimpse of a Wild Cat was also seen in high grass at Kagio between Fort Hall and Embu boma.

Mr. HAMPTON of Nairobi showed me two skins of Wild Cats trapped at Escarpment.

This species is thus probably to be found in suitable localities a little everywhere in Brit. East Africa but difficult to obtain. Without material for comparison it is impossible for me to say to which subspecies the Wild Cat of Brit. East Africa belongs,¹ but Pocock has expressed as a supposition that a Cat caught at Nyiri near Fort Hall (not in Uganda!) belongs to the race *F. o. ugandae* SCHWANN (conf. Proc. Zool. Soc. London 1907, p. 668).

¹ In this connection I am able to add a little to the knowledge about *Felis ocreata mellandi* SCHWANN (Ann. & Mag. Nat. Hist. ser. 7, Vol. XIII, p. 423) of which a very fine male specimen has been presented to this Museum by Mr. A. SANDBERG of Bulawayo. This specimen corresponds fully with SCHWANN's description (l. c.) as far as it reaches, except that the underfur on the median line is not »dark brown or black» as is stated in the »key» (l. c. p. 426). It is black on the nape and fore-head but not on the body anywhere. It is there mostly dull cinnamon buff but in some places, as above the shoulders dull greyish brown. As SCHWANN's specimens were mutilated with regard to their tails I may state that the tail is rather long, measuring in the tanned

Felis caracal nubica (FITZINGER) MATSCHIE.

MATSCHIE: Säugethiere Deutsch-Ost-Afrikas. Berlin 1895, p. 67.

I did not see any living Caracal during the expedition but in Nairobi I saw two skins from the Kedong valley and purchased one of them for the sake of evidence, although it was not in good condition, but there was a skull to it, the measurements of which are given below:

Greatest length of skull	114 mm.
Basiscranial length	96 "
Zygomatic breadth	77 "
Greatest length of nasals (laterally)	27 "
Least interorbital width	23 "
Breadth across postorbital processes	46 "
Least postorbital width	33 "
Combined length of p ³ and p ⁴	23,5 "
Length of p ⁴	14,2 "
Length of bullae	24 "

As I do not have sufficient material for comparison I can neither confirm nor contradict MATSCHIE's views about the East African Caracal but have to leave that to the future. His description of the colouration agrees with the present specimen which, although fully adult, displays quite visible spots on the lower side.

Cynælurus jubatus guttatus (HERMANN).

MATSCHIE: Die Säugethiere Deutsch-Ost-Afrikas, p. 70.

Cheetahs were observed a few times in different localities. In January I saw one at a great distance running with great speed over the steppe not far from Nairobi. South of Guaso Nyiri I saw a specimen in high grass which hid the body, and in spite of its small head it looked like a Lioness. A male specimen was shot ⁸² near Lekundu river, south of Guaso Nyiri, by Mr. Å. SJÖGREN who permitted me to keep the skull for the collection. The dimensions of this skull are as follows:

skin 36½ cm. It has a black tip and two subterminal black rings well developed, and traces of others. As the skull of this race is unknown the following measurements may be given.

Total length of skull	105 mm.
Condylbasal length	95 "
Basiscranial length	88,5 "
Zygomatic width	75 "
Width of brain-case	49 "
Least interorbital width	19 "
Length of nasal mesially	23 "
Fossa lacrymalis to tip of nasal laterally	20 "
Greatest length of bulla	23,5 "
Front of canine to back of pm ³	32,4 "
Length of pm ³	12,6 "

Condylobasal length	160 mm.
Basal length	151 "
Zygomatic breadth	130,5 »
Interorbital breadth	43,5
Least postorbital breadth	57
Distance between postorbital processes	80
Length of nasals mesially	44 »
Greatest combined breadth of nasals in front	33
Length of p ¹	21,6 »
Distance between bullae in front	20,5 »
Width of palatal opening at sut. palatopterygoidea	13,4 »

This skull offers the strange anomaly that p¹ and m¹ are entirely missing on the right side, and there is no trace of any alveole, nor of any healed wound on the jaw bone so that this defect is evidently inborn.

The Cheetah in question was infested with ticks of the species *Rhipicephalus armatus* which never have been found on this animal before.¹

Glires.

Sciuridæ.

Heliosciurus keniaë NEUMANN.

NEUMANN: Sitzber. Ges. Nat. Freunde. Berlin 1902, p. 176.

In the journal quoted O. NEUMANN has shortly described a Squirrel from Kenia without giving any measurements of the animal or its skull. It is thus chiefly for geographical reasons that two Squirrels obtained 28th of Jan. in the primeval forest on the eastern slopes of Kenia are referred to this species. Five more Squirrels shot in the forest at Meru boma and a sixth from a forest two hours march to the north of the latter locality are quite similar to those from the Kenia forest. The general colour of the upper parts is very dark olive brown. The hairs are black with shiny black tips, a subterminal dull yellowish white ring, and a lower whitish ring which often has a more or less strong tint of fawn. The underfur is richly developed, long and reaching the level of the lower light ring. The underfur is broadly tipped with fawn (in some specimens more ochraceous, in some others more reddish which blends together with the lower light ring of the hair. Basally the underfur is black. The lower side is dark brown and the hairs are ringed with fawn, sometimes with yellowish tan colour (Rép. de Couleurs 315). In some specimens hairs with whitish rings are found mesially and on the inside of the hind legs, but even in such specimens the majority of the hairs are ringed with fawn or yellowish. From the throat a white patch extends to between the fore legs. This white mark which NEUMANN

¹ Conf. L. G. NEUMANN: Ixodides. Ark. f. Zool. Bd. 7, no 24, p. 6. Stockholm 1912.

has mentioned as existing in the single specimen on which he based the name is present in all my specimens.¹ Around the eyes a more or less defined fawn coloured ring is to be seen. The sides of the head is otherwise nearly similar in colour to the lower parts. The hair of the tail is black with white tips and three yellow rings. The colour of these rings is, when the tail is in fresh pelage, most similar to Mars yellow (Rép. de Couleurs, 316), sometimes more yellowish tan, sometimes inclining to fawn. The tip of the tail looks almost black because the white tips to the hair are absent there and the light rings more or less reduced in number. The upper one is absent, and sometimes the two others as well.

The length of the skins (head and body) is 22—25 cm.

The length of the tail varies from 22 to 26,5 cm.

The length of the hind foot is about 48—50 mm. without claws.

The maximum length of the skulls varies from 52,5 to 55 mm. 54 being the usual size of old specimens.

	♂	♀	♀
	mm.	mm.	mm.
Maximum length of skull	54,2	52,5	55
Condylolncisive length of skull	47,2	47,1	48,5
Zygomatic width of skull	31	30,7	31,8
Least interorbital width of skull	16,7	16	17,7
Length of upper molar series	10	10,2	10
Length of diastema	11,3	11	12
Width of palate between premolars	7,5	7	7,7
Length of palate	21,4	21,6	23

All these specimens are fully adult with worn molars. They are from the forests near Meru boma. The specimens from Kenia have the same dimensions.

As the dark fur indicates, this Squirrel is an inhabitant of the dark and thick forest. Often two or three specimens were found in company, and at least once it was stated that both were adult females. They appear thus to be sociable independently of sex.

Paraxerus jacksoni (DE WINTON).

DE WINTON: Ann. & Mag. Nat. Hist., Ser. 6, Vol. XIX, 1897, p. 574.

and

Paraxerus jacksoni capitis THOMAS.

THOMAS: Ann. & Mag. Nat. Hist., Ser. 8, Vol. IV, 1909, p. 105.

The type specimen of *P. jacksoni* is stated to be from Kikuyu, while the type of *P. j. capitis* is from Nairobi Forest. I have collected six specimens from the

¹ Mr. R. B. WOOSNAM showed me a pair of dark Squirrels shot near Escarpment which had no such white throat mark. As they otherwise resembled the Kenia Squirrel it is probable that they only represented a melanistic phase of the same.

surroundings of Nairobi which thus must represent the latter subspecies. It is a little doubtful which exact locality is meant with 'Kikuyu'. Nairobi is also situated in the typical Kikuyu country. A little to the northwest of Nairobi a railroad station is named 'Kikuyu', and somewhat still further northwest Escarpment station is situated which sometimes is called Kikuyu Escarpment. Nairobi lies at an altitude of a little more than 5000 feet, and Escarpment at about 8000 feet. At the latter place I collected two specimens of similar Squirrels. If there was any difference between the Scrub Squirrels of Nairobi and those of Kikuyu this difference ought to be still more pronounced in the corresponding animals from Escarpment, as Kikuyu with regard to geographical situation and altitude is intermediate between the two other places.

According to THOMAS *P. j. capitis* shall be paler on the body than *P. jacksoni* and on the extremities ochraceous replaced by buffy, "and buff by whitish". In the subspecies the under surface is said to be soiled whitish or creamy white, the corresponding part in true *jacksoni* cream-buff or buff.

When comparing my specimens from Nairobi and those from Escarpment, I cannot find any perceptible difference in the colour of the upper parts of the darkest specimens from Nairobi and those from Escarpment, and in a similar way the extremities are just as richly coloured in some of the Nairobi specimens as in the others. The lower surface of the Nairobi specimens is, as a rule, paler and more whitish than corresponding parts of the Escarpment specimens but in some of the former it is distinctly buffy, and the difference from the latter in colour is then very slight if any at all. Considering the great variation in colour among Squirrels and the considerable bleaching of the fur to which they are subjected, as also is pointed out by THOMAS (l. c. p. 106), I do not believe it possible to maintain *P. j. capitis* as a different race on account of any difference in colour. It remains then to see if any other distinguishing characteristic can be found. DE WINTON states the length of the tail of *P. jacksoni* to be 155 mm., while THOMAS gives the same measurement of *P. j. capitis* as 187 mm. The longest tail of my two Escarpment specimens is about 15 cm., but in some of the Nairobi specimens it is very little more, and it seems hardly possible to base a subspecies on such small differences in length of such a variable organ.

From a geographical and topographical point of view there is no reason to suspect the presence of different Scrub Squirrels at Nairobi and any other place in the Kikuyu country.

These little Squirrels are on the move even in the middle of the day. They were usually found in bush, sometimes outside, sometimes in the middle of the thick and dark forest. Seldom they were observed in trees and then not in very high trees. At Escarpment station I shot my specimens among the remaining dry tops and branches of big cedars which had been cut down. When moving among the green foliage these Squirrels look quite greenish and are not easily seen. Their colour can certainly be called protective. When they are quietly running along a branch

in the dim light in thick bush they look more like an indistinct greenish shadow than a living animal and disappear very quickly out of sight.

***Paraxerus jacksoni kahari* (HELLER).**

HELLER: Smiths. Miss. Coll., Vol. 56, 1911, No 17, p. 2.

Five specimens of Scrub Squirrels were collected in the neighbourhood of Meru boma and the native village Kanyakeni, where they mostly were found in the shambas, which were surrounded by hedges and contained small trees planted to support the yams-vines. These specimens looked when alive very much like those collected around Nairobi. A closer examination reveals, however, that the Meru Scrub Squirrel which HELLER recently has named *P. kahari* has a considerably smaller skull, with shorter, less constricted preorbital region, narrower occipital region, shorter diastema and so on.

For comparison a few measurements of a skull from Nairobi and another of similar age from Meru boma are given:

	Nairobi	Meru boma
	mm.	mm.
Maximum length	43,8	40,7
Condylomeisive length	39,1	36,4
Zygomatic width	25,2	23,7
Least interorbital width	11,5	11,3
Length of upper molar series	7,5	7,3
Length of nasals	12	11
From behind postorbital process to anterior end of nasal suture	24,2	22,1

***Xerus rutilus dabagala* (HEUGLIN).**

HEUGLIN: Nov. Act. Acad. Leop. Car. Nat. Cur., T. XXVIII, p. 4, Tab. 2.

or: ***Xerus rutilus rufifrons* (DOLLMAN).**

DOLLMAN: Ann. & Mag. Nat. Hist. 1911, Ser. 8, Vol. VII, p. 518.

On the southern side of Guaso Nyiri I observed Ground Squirrels in a patch of thornbush, but I could not obtain any specimens there. On the northern side of the same river they were more common, and I collected eight specimens at Njoro and other places, even below Chanler Falls.

My specimens agree with the description of *X. rufifrons* which DOLLMAN has based on specimens obtained in the same localities in which short time afterwards I collected some of mine. But, of course, there is some variation in colour even among specimens caught at exactly the same place. Some specimens are entirely pinkish brown (conf. below) all over back and sides with hardly any blackish sprinkling at all visible, not even on the back of the head, and with no difference whatever

between a dorsal area and the flanks. Such specimens agree very closely in colour with HEUGLIN's *Xerus dabagala* which, I suppose, is only a geographic race of *X. rutilus* as well, and, of course, closely related to this race, if different at all. DOLLMAN states (l. c.) that the skull of his *Xerus rufifrons* is «similar to that of *X. dabagala*», which makes the identity of these two still more plausible. The author quoted points out, however, some differences between *X. dabagala* and *X. d. rufifrons* which ought to be discussed. The first of these is that the back of the head of the latter is «slightly darker than rest of dorsal surface and speckled with bright yellow and orange-red», while according to DOLLMAN the head of *X. dabagala* should be «greyish brown». But the latter colouration of the head of *X. dabagala* is not mentioned in VON HEUGLIN's original description, nor displayed in the coloured figure of the type.¹ «Muzzle and forehead bright orange-red (tan colour n:o 2, 'Répertoire de Couleurs')» — DOLLMAN writes about *X. rufifrons*, and then he adds: «The orange-rufous tint is much brighter and more vivid than in *X. dabagala*, where the muzzle is more the colour of the flanks». In one of my specimens from Njoro the colour of the muzzle and the forehead agrees perfectly with DOLLMAN's description and the colour-sample quoted, but in the others this is less apparent and the colour of the parts mentioned is more brick-red, especially on the forehead, even if the colour of the muzzle tends more or less to «orange rufous». In some specimens the general colour of the forehead is similar to that of the flanks, although the latter are sprinkled with white and therefore look paler. The general ground colour of my specimens lies between «Salmon flesh» (Rép. de Couleurs N:o 138, 4) and «Red ochre» (l. c. N:o 332, 1). In some specimens it is very close to the first, in some others to the latter. This ground colour is modified by the white tips of the hairs. In some specimens the colour of the median dorsal area, to different breadth in different specimens, has another colour, viz. speckled or grizzled with blackish and yellow. An examination of the hairs, which produce the colour of this dorsal area, proves that they are coloured according to a different pattern than the salmon flesh — red ochre and white-tipped hairs of the flanks of the same specimens. They are ringed in such a way that the tip is black, or dark brown then follows an ochre-yellow ring, and then again a black or dark brown ring. The dark tip is of different length, often quite short and it may then be broken or worn off and missing.

As these black and yellow-ringed hairs occupy an area of different extension in different specimens, and sometimes are absent, or at least mixed with the red ochre and white-tipped hairs it appears probable that they are the remains of another pelage which is to be shed, and has been fully shed in such specimens with uniform red ochre and white-tipped pelage.

DOLLMAN says that the bright orange-yellow (maize-yellow) «sides of muzzle, face and neck» of his *X. rufifrons* is «strikingly different from the white face and neck of *X. dabagala*». HEUGLIN says, however, about *X. dabagala* — «rostri apice lateribusque gulæ in flavidum vergentibus», and this is also displayed by the coloured

¹ Nov. Act. Acad. Leop. Car. Nat. Cur., Tom XXVIII, p. 4, Tab. 2, fig. 3.

plate. In my specimens the colour of the parts mentioned varies from the palest maize-yellow to rather pronounced orange-yellow. Sometimes this yellow tinge extends all over the throat, but oftener the latter is white in the middle.

Considering the variation I think it is difficult to maintain any difference between *X. dabagala* and *rufifrons*.

The cranial measurements agree with those recorded by DOLLMAN in the largest specimens, but some fully adult are a little smaller.

	♀	♂	♂
	mm.	mm.	mm.
Greatest length of skull	52	52	54,7
Condylobasal " " "	47,7	47,2	51
Condylobasilar " " "	42,4	42,3	45
Zygomatic width	—	30	29,2
Interorbital "	14,2	15,7	15,5
Length of nasals	17	17,7	17
Width of palate inside m. ¹	7	7	7,3
Length of upper cheekteeth	9,4	10	10,3

These Ground Squirrels lived in colonies and are rather shy. Their general colour agreed very well with the reddish gravel, and in the glare of the sun it was not easy to follow their movements with the eye, when they had been disturbed and ran for their holes. The vegetation around the colonies was always very scanty because the Squirrels had eaten almost everything palatable to them. The locality of a colony could therefore be detected already before any burrows had been seen. Sometimes a colony of *Helogale* was found at the same place.

Myoxidæ.

Graphiurus parvus dollmani OSGOOD.

OSGOOD: Field. Mus. Nat. Hist. Zool. Ser. Vol. X n:o 3, 1910, p. 15.

A specimen caught at Kutu (between Fort Hall and Embu boma) ²⁴, 1911 agrees with regard to dimensions and colour with OSGOOD's description except that the blackish area around the eye is only little developed and not well defined. The skull is unfortunately broken so that all skull characters cannot be verified, but those about which information can be obtained are in accordance with the description of the type which is from Ulu Kenya Hills, British East Africa.

Muridae.

Otomys irroratus elgonis WROUGHTON.

WROUGHTON: Ann. & Mag. Nat. Hist. Ser. 8, Vol. V, 207.

One male and three females of this Rat were trapped on the eastern side of Kenia partly at an altitude of 2,500 m. around a glade in the primeval forest, partly at an altitude of 2,700 m. among a vegetation of tall plants of different kinds on a hill which rose a little above the mixed forest and bamboo region. The temperature at this latter place was rather low, about + 2° C in the early morning, but the very rich fur of this species appears to give it full protection. About half of the visible portion of the upper incisors and the molars in both jaws (but not the lower incisors) are blackened probably by the food.

I believed at first that these specimens belonged to *O. i. tropicalis* THOMAS described from Kenia, but a closer examination of the skulls revealed that their dimensions agreed better with WROUGHTON's subspecies. Especially striking appeared to me the interorbital breadth which in my specimens is 4.5 mm., in the type of *O. i. elgonis* 4.6 mm, but in the type of *O. i. tropicalis* only 3.3 mm. Other dimensions as well agree with WROUGHTON's description of *O. i. elgonis*. The frontal crests are not strongly developed.

Otomys angoniensis elassodon OSGOOD.

OSGOOD: Field Mus. Nat. Hist. Zool. Ser. Vol. X no 2, p. 10.

Five Specimens which fully agree with regard to their measurements and skull characters with OSGOOD's description (l. c.) were collected at Kagio at Kutu (between Fort Hall and Embu boma) $\frac{23-25}{1}$, and at Guaso Nyiri on its southern side near Lekiuindu river and also near the ford on the Marsabit road. The type locality is Naivasha but it has also been recorded from "Rumruti, Laikipia plateau". My localities prove that it is to be found to the north and east of Kenia as well.

One or two of my specimens are a little paler and might with regard to colouration approach *O. nyikæ canescens* OSGOOD (l. c. p. 10), but the cranial measurements of these specimens as well, agree better with those of the other race as quoted above.

Dendromys insignis.

THOMAS: Ann. & Mag. Nat. Hist. Ser. 7, Vol. XII, p. 341.

An old male with nearly worn out teeth of this pretty Tree-mouse was trapped near Escarpment station among bush in the forest ¹²1 1911. This specimen agrees very well with regard to size and colour with THOMAS' description (l. c.) of the type from Nandi. Specimens obtained at the native village Kazere northeast of Kenia

$2\frac{2}{3}$, and near Kutu $2\frac{2}{3}$ are decidedly more greyish so that I was rather doubtful whether they belonged to the same race. They were therefore sent to British Museum for comparison and their identity was kindly confirmed by Mr. DOLLMAN. In the Kazere specimen the black dorsal stripe is also narrower than in the others. This may depend upon the fact that this one is comparatively young, although adult, but the variability in colour of this species appears to be rather great.

***Thamnomys oblitus* OSGOOD.**

OSGOOD: Field Mus. Nat. Hist., Zool. Ser. 1910, Vol X no 3, p. 16.

A specimen of this kind was caught $1\frac{1}{3}$ on the acacia steppe at Lekundu river south of Guaso Nyiri Mr. GUY DOLLMAN has kindly examined the specimen and communicated the result.

This species has been described on a single specimen from Voi, Brit. East Africa. It is thus of interest to state that it extends northwards to the steppe country just south of Guaso Nyiri.

***Epimys rattus* LINNÆUS.**

A series of this Rat was collected at Nairobi, where it was common. They were all of the blackish variety.

***Epimys medicatus* WROUGHTON.**

WROUGHTON: Ann. & Mag. Nat. Hist., 1909, Ser. 8, Vol. IV, p. 540.

This species appears to be the common big Rat at Meru boma. Several specimens were trapped there as well when we passed on our way northward the first days of Febr. as when we were on our way back in the end of March.

One of my specimens has been compared with the type in British Museum by Mr. GUY DOLLMAN.

This species was originally described from Mumias, Brit. East Africa, but has afterwards been recorded from Rumruti and Baringo. Meru boma is, however, as yet the easternmost locality of the species.

***Epimys hindei* THOMAS.**

THOMAS: Ann. & Mag. Nat. Hist. 1902, Ser. 7, Vol. IX, p. 218.

A specimen of this Rat was caught near Ruiru river $3\frac{1}{4}$ 1911. The type was described from Machakos, and the ROOSEVELT Expedition found it on the Athi and Kapiti plains. It has also been recorded from Kibonoto, Kilimanjaro by the present

author on material collected by SJÖSTEDT. THOMAS regards it as «most closely allied to the peculiar Nyasan *M. nyika*». As I did not find it further north it is probably confined to the typical East African steppe s. str.

***Epimys effectus* DOLLMAN.**

DOLLMAN: Ann. & Mag. Nat. Hist. 1911, Ser. 8, Vol. VII, p. 524.

A very large series of specimens of this Rat had been collected, especially from Meru boma, but also from the native village Kanyakeni in the Meru country south of the boma and further at Kutu, Kagio, Fort Hall and Punda Melia. To the north of Meru boma at upper Luazomela river some young rats were caught at a place where natives had made a clearing and built some huts, and these young specimens belong probably to this species as well.

There is a considerable amount of variation in this species with regard to colour. Some specimens are rich buff or tan-coloured on the sides, more or less overlaid with dark brown or black on the back. The specimens of this colour pattern are white on the ventral surface with a sharp line of demarkation between the white and the bright buff of the flanks. Other specimens are dark brown on the back, greyish brown on the sides, more or less suffused with dull buff; and the lower surface of these specimens does not show a single white hair but is dark slaty, or blackish grey with dull buffish tips to the hair. Between the two extremes thus described there are many intergrading links, but the intermediate ones are less common so that it may be spoken of a white-bellied and a dark-bellied phase. Both may occur at the same locality, but at Meru boma the dark phase was more common.

To make sure about the identity I sent a representative of either phase to British Museum where the author of the species kindly examined them and signed both with the name *effectus*.

The juvenile pelage of *E. effectus* is, as DOLLMAN has stated, ashy grey, but it is darker on the back, inclining to blackish, and a buffish wash of the sides appears sometimes in rather early stages.

In the Meru country this Rat appears to live chiefly in and around the native villages as a house-rat. It is of interest that at least at Meru boma it occurs together with *Epimys medicatus*.

In one of the specimens from Punda Melia the skull is anomalous as the last molar of the upper jaw is missing, but in the lower jaw it is present.

***Epimys panya* HELLER.**

HELLER: Smithson. Misc. Coll. 1910, Vol. 56 no 9, p. 2.

The type-locality of this Rat has been stated to be Juja farm or the Athi plains. At this same locality I obtained a topotype. Specimens which without

hesitation may be referred to the same species were also caught at Fort Hall, at Ruiru river, at a village about 2 days march south of Meru boma etc. I am less sure about the identity of some Rats from Kagio because it is not easy to distinguish this species from young *E. effectus*.

***Epimys jacksoni* DE WINTON.**

DE WINTON: Ann. & Mag. Nat. Hist. 1897, Ser. 6, Vol. XX, p. 318.

Specimens of this long-tailed Rat were collected in the lower forest region of Kenia, and a little outside the same between Embu boma and Meru boma the last days of January. Some of these specimens are decidedly much larger than DE WINTON's type from Ntebbe,¹ but after comparison with the collections in British Museum Mr. DOLLMAN has stated the identity.

The dimensions of my three largest specimens are:

♂	Head and body	118 mm.,	tail 153 mm.
♂	" " " " " "	115 " "	140 "
♀	" " " " " "	116 " "	142 "

Length of hind-foot about 26 mm. with claws, a little more than 24 without them.

This Forest Rat has also been found on Kilimanjaro (LÖNNBERG), and south of Tanganyika (DOLLMAN). On Ruwenzori lives a closely allied subspecies.

***Epimys denniæ* THOMAS.**

THOMAS: Ann. & Mag. Nat. Hist. 1906, Ser. 7, Vol. XVIII, p. 144.

A specimen which well agrees with THOMAS' description was caught in the mixed bamboo and forest belt of Kenia at an altitude of 2,700 m. A younger and darker specimen trapped at the same locality may also be referred to this species in spite of the difference in colour, which may be due to its age.

This species was originally described from Ruwenzori, and THOMAS compared it with *E. carillus* from northern Angola, Pungo Andongo, and with *E. allenii* from West Africa and Congo. This is of interest because it proves the western affinities of this Forest Rat.

¹ THOMAS has, however, declared this one to be young. Ann. & Mag. Nat. Hist. 1906, Ser. 7, Vol. XVIII, p. 145.

Zelotomys hildegardæ (THOMAS).

THOMAS: Ann. & Mag. Nat. Hist. 1902, Ser. 7, Vol. IX, p. 219.

OSGOOD: Field Mus. Nat. Hist. Zool. Ser., Vol. X no 2, p. 7.

A specimen of this interesting Rat was caught at Juja farm ¹⁹/₁ 1911. Its tail is whitish almost all around. In another specimen from Ruiru river the tail is greyish above.

The species was originally described on specimens from Machakos and Kitui. It is thus one of the endemic forms of East Africa s. str.

Leggada bella THOMAS.

THOMAS: Ann. & Mag. Nat. Hist. 1910, Ser. 8, Vol. V, p. 87.

This little Mouse was trapped at Punda Melia ²²/₁ 1911.

Leggada triton THOMAS.

THOMAS: Ann. & Mag. Nat. Hist. 1909, Ser. 8, Vol. IV, p. 548.

This dark little Mouse was first caught ²⁵/₃ in three specimens at a place called Kazere situated outside the Kenia forest on partly cultivated ground, 2,125 m. above the sea. Two more specimens were trapped resp. in the upper forest region of Kenia at an altitude of 2,700 m., and a little lower down, or at an altitude of 2,450 m. At our first camp on the way back outside the forest at a place situated in the cultivated region not very far from Kutu and at an altitude of 2,000 m. four more specimens were trapped. These were rather young specimens with not worn molars, and the total length of their skulls was only about 21 mm. but the condylo-basal length from 19.5 to 20 mm. These measurements agree better with HELLER's *Leggada* [*triton*] *nairashæ* but I think this is dependent on the youth of the specimens. Those from Kazere had worn teeth and were considerably larger with a condylobasal length of 21.2 to 21.7 mm.

THOMAS compares this species especially with the western *L. musculoides*.

Leggada triton murilla THOMAS.

THOMAS: Ann. & Mag. Nat. 1910, Ser. 8, Vol. V, p. 91.

A specimen caught at Blue Post Jan. 21 1911 is conspicuously paler than the Pigmy Mice trapped in the Kenia forests and at higher altitudes in the cultivated country so that I think it right to refer it to the subspecies *murilla*. The lower parts of this specimen is also more purely white than corresponding parts of the forest specimens. It is, however, probable that intergrading links may be found.

***Cricetomys gambianus kenyensis* OSGOOD.**

OSGOOD: Field Mus. Nat. Hist. Zool. Ser. Vol. X, no 2 1910., p. 9.

Two specimens of this Giant Rat were trapped in the primeval forest on the slopes of Kenia, the first near Kitwai river one days march from Embu boma ²⁷, the other one days march further north. The skull measurements of the somewhat larger male specimen agree quite well with those of the type (l. c.) which also was a male obtained from the southern side of Kenia. The female is a little smaller, although its teeth are more worn and indicate a more advanced age. It was caught in a hollow log.

***Lophuromys aquilus zena* (DOLLMAN).**

TRUE: Proc. U. S. Nat. Mus. Vol. XV, 1892, p. 460.

DOLLMAN: Ann. & Mag. Nat. Hist. Ser. 8, Vol. IV 1909, p. 550.

This easily recognizable rat was collected in eighteen specimens at the following localities: Escarpment, 8,000 feet¹; Kenia, 2,700 m.; Kenia, 2,500 m.; Kenia, 2,450 m.; in shambas not far from Embu boma 2,000 m.; at Embu boma; at Kutu south of Embu boma; at Meru boma about 5,300 feet², and somewhat south of the last place. It was trapped as well high up on Kenia at an open place in the bamboo-region at an altitude of 2,700 m. where the climate was rather harsh,¹ as lower down in the cultivated region. It does not seem, however, to descend to the real low and hot country.

A remarkable fact is that such a great number of specimens of this kind have mutilated tails, viz. 7 out of 18. Of these 4 are entirely without tail, and in 3 the distal portion of the tail is missing. In all seven this had happened before the animal was trapped so that the wound was entirely healed. It may also be remembered in this connection that TRUE's type specimen had the tail somewhat mutilated, and the only specimen collected by SJÖSTEDT had the tail mutilated as well. This proves that it is quite a common occurrence in this species that its tail is lost entirely or partly. It is evident that this might be caused either by foes of other kinds, or when the animals fight with members of their own species. The latter appears perhaps less probable, partly because males and females have lost their tails in nearly equal number and partly because the tail must be lost when the rat is pursued, not when it is fighting. It appears thus more probable that the tail is lost to a pursuing foe of some kind. It is also evident that this partial loss must be of considerable importance to the species as such a great percentage of specimens survive in a mutilated state. In spite of the fact that the lost parts do not appear to be reproduced in this case, it is evidently a kind of autotomy that takes place to the benefit of the species.

¹ + 1,5° C. was observed in the evening and + 2 C° in the morning at sunrise.

² L. c. and Ann. & Mag. Nat. Hist. ser 8, Vol. VII, p. 529.

DOLLMAN has named the race occurring on the Aberdare Range and on Kenia *L. zena*.² The difference from the typical *L. aquilus* from Kilimanjaro appears to be very small. More than subspecific rank can impossibly be admitted to *L. zena*, and intermediate links may be found. The author quoted has also described an allied form (*L. rubecula*) from Elgon.

Saccostomus mearnsi HELLER.

HELLER: Smiths. Misc. Coll. Vol. 1910, 54 p. (n'o 1924) p. 3.

A specimen of this interesting Rat was trapped $\frac{1}{2}$ at Luazomela river, a tributary from the south to Guaso Nyiri. It agrees with HELLER's description and figures of the skull. The only difference appears to be that the nasal region of my specimen is slightly narrower, but as it is a female, and the type is recorded to be a male, such a little difference might easily be explained as a sexual variation.

Acomys ablutus DOLLMAN.

DOLLMAN: Ann. & Mag. Nat. Hist. Ser. 8, Vol. VIII, p. 127.

Four specimens of this comparatively short-tailed Spiny Mouse were caught not quite a week later than DOLLMAN's type viz. $\frac{5}{2}$ - $\frac{7}{2}$ 1911 at our camp near Lekundu river not much south of Guaso Nyiri. This place is situated not far from the type locality »Nyama Yango».

Three of my specimens have a little larger skulls than DOLLMAN's type viz. measuring in total length 23,2 mm. (♂), 23,4 mm. (♀) and 23,5 mm (♀).

The last of these has:

Condylolincisive length	21,7 mm.
Zygomatic width	11,3 »
Least interorbital breadth	4,3 »
Width of braincase	10,7
Length of nasals	9,5 »
Length of upper molar series	3,7 (3,8) mm.

These measurements except the last are somewhat larger than those recorded by DOLLMAN, and it is thus probable that his type specimen was not quite fullgrown.

It appears uncertain whether this Spiny Mouse should be regarded to be anything more than a geographic, less rufous subspecies of *A. wilsoni* THOMAS.

The country where my specimens were caught is a stony acacia-steppe but at least one of the specimens was trapped among reeds near the little river.

¹ »Nyama Yango» = »my meat», was the name among the natives of the late A. H. NEUMANN, and his old camp is, undoubtedly, the place meant in DOLLMAN's paper.

***Acomys percivali* DOLLMAN.**

DOLLMAN: Ann. & Mag. Nat. Hist., Ser. 8, Vol. VIII, p. 126.

Fourteen specimens of this dark slate-coloured Spiny Mouse were collected north of Guaso Nyiri at the water place Njoro, and below Chanler Falls. Some of the specimens were damaged by the ants and many destroyed. The same was the case with the following species. As soon as the mice had been killed in the traps, the ants devoured their nose, feet, ears etc. so that many specimens had to be thrown away.

The dimensions of my specimens agree on the whole with the measurements recorded by DOLLMAN. Some of my specimens have, however, the tail measuring as much as 90 mm. The dimensions of the skulls are perhaps generally a little smaller than those recorded by DOLLMAN as may be seen from the following table of measurements for which only skulls with worn teeth have been used:

	♂	♂	♀	♀
	mm.	mm.	mm.	mm.
Greatest length	27,3	26,3	26,3	25,3
Condylolncisive length	24,6	23,5	24,2	22,8
Zygomatic breadth	12,7	12,3	12,3	11,4
Interorbital breadth	4,4	4,2	4,4	4,4

None of my specimens exhibits any rufous phase, but some are darker than the others.

This species is evidently common in the thornbush country north of Guaso Nyiri below Chanler Falls.

***Acomys kempi* DOLLMAN.**

DOLLMAN: Ann. & Mag. Nat. Hist., Ser. 8, Vol. VIII, p. 125.

Fourteen specimens of this bright-coloured Spiny Mouse were collected in Febr. and March 1911 at various localities on the northern side of Guaso Nyiri from a place not much east of the ford on the Marsabit road, and to some distance below Chanler Falls in the east, and northwards as far as at the water place of the Rendiles called Njoro. The type locality recorded by DOLLMAN (l. c.) is included in this area. Some of my specimens have been damaged by the small but extremely voracious ants of this thornbush-country, which entirely spoiled several more specimens of this mouse as well as others. Those which I have preserved in a good state prove that the variation of the length of the tail is much greater than DOLLMAN could observe on his two specimens. It varies in adult specimens from less than 90 mm. to 107 mm. The length of head and body recorded appears to be rather too great.

The skull measurements of my specimens agree on the whole quite well with DOLLMAN's, but are not seldom a little smaller proving that his type specimen was perhaps a little larger than the common average. The difference in size between DOLLMAN's *A. kempi*, and his *A. pulchellus* with regard to the dimensions of the skulls disappears thus completely in fully adult specimens, but the differences in exterior characteristics appear to hold good, at least with regard to such specimens which I have obtained of *A. pulchellus*.

From *A. ignitus* this species is said to differ by its far paler colour, longer tail, and very much smaller skull with less inflated bullæ.¹ Of these characteristics the length of tail evidently is variable.

***Acomys pulchellus* DOLLMAN.**

DOLLMAN: Ann. & Mag. Nat. Hist. 1911, Ser. 8, Vol. VIII, p. 127.

This was the comparatively least numerous of the *Acomys* on the northern side of Guaso Nyiri. I have only three specimens in the collection saved from the ants. All these are comparatively young and therefore the colour does not fully agree with DOLLMAN's description of the type, but the author quoted has kindly stated the identity. In my specimens the upper parts of the head and the anterior part of the back is slate grey. The posterior part of the back is dull buff, sprinkled and washed with slaty. The flanks and sides of the head are pale snuff brown (Rép. de Couleurs, 303, almost paler than shade no 1 on the plate). The lower parts are white, sharply marked off from the flanks. This may represent the colouration of the not yet fully mature animals.

***Dasymys savannus* HELLER.**

HELLER: Smithson. Misc. Coll., 1911, Vol. 56, No 17, p. 14.

A specimen of this kind was trapped near Itiolu river south of Guaso Nyiri ⁴/₂ 1911. The type locality is stated to be Fort Hall.

HELLER regards this species to be most nearly related to *D. masonæ* from South Africa.

***Arvicanthis abyssinicus nairobiæ* (ALLEN).**

ALLEN: Bull. Amer. Mus. Nat. Hist. 1909, Vol. XXVI, Art. XII, p. 168.

A specimen of this race was trapped at Juja farm ¹⁹/₁ 1911.

¹ DOLLMAN l. c.

***Arvicanthis abyssinicus præceps* WROUGHTON.**

WROUGHTON: Ann. & Mag. Nat. Hist., 1909, Ser. 8, Vol. IV, p. 538.

A specimen caught at Fort Hall ³¹ in 1911 has been sent to British Museum for examination, and Mr. GUY DOLLMAN has kindly communicated that it is identical with WROUGHTON's subspecies described from Naivasha under the name quoted above. This variety has also been recorded from Baringo and Rumruti on the Laikipia plateau, and from Nandi by DOLLMAN¹, but not east of Kenia before this.

***Arvicanthis somalicus reptans* (DOLLMAN).**

DOLLMAN: Ann. & Mag. Nat. Hist., 1911, Ser. 8, Vol. VIII, p. 129 & 352.

A series of nine specimens of this race were collected around our camp at Lekundu river only a short distance from Nyama Yango, the type-locality recorded by DOLLMAN, and only a few days later viz. 8–9 Febr. 1911. Three more specimens were caught on the southern side of Guaso Nyiri at the ford on the Marsabit road 11–13 Febr. 1911. The latter specimens are darker than those from Lekundu river and have less buff on the sides and on the face. The lower side of one is also considerably darker. This is, however, undoubtedly only individual variation. The variability is also in other respects evidently a little greater than is expressed by DOLLMAN (l. c.). The greatest length of the skull of my biggest male specimen from Lekundu is 30.3 mm. Condylolincisive length 28.2 mm. but zygomatic breadth only 15 mm.; interorbital constriction 4.7 mm., length of nasals 11 mm. etc. as recorded by DOLLMAN.

I suppose that this race is to be regarded as a southern representative of *A. somalicus*, which also is in accordance with the occurrence of other representatives of the Somalifauna in the country round Guaso Nyiri.

***Arvicanthis pulchellus massaicus* (PAGENSTECHER).**

PAGENSTECHER: Jahrb. Hamburg. wiss. Anst., 1884, p. 45.

This Striped Rat was found to be common in the Kikuyu and Meru countries and was collected in 19 specimens at the following localities between Nairobi and Meru boma enumerated from south to north, Blue Post, Punda Melia, Kagio, Kutu, Embu boma, in the forest on eastern Kenia, in shambas 2000 m. above the sea, at Kazere, and another place not far southwest of Meru boma, and finally at the latter place itself. It was as a rule found in or near shambas, or in places which had been formerly cultivated. Only once it was found in the forest of Kenia, and never on the acacia-steppe north of Meru, or in the thornbush north of Guaso Nyiri.

¹ Ann. & Mag. Nat. Hist. 1911, Ser. 8, Vol. VIII, p. 348.

THOMAS has recently described¹ a new subspecies, *Arvicanthis pulchellus ardens*, from Kilimanjaro which is said to differ from *A. p. massaicus* in their brown ground colour, buffy stripes, and strongly buffy feet (l. c. p. 314). I have therefore compared specimens from Kilimanjaro with my own from British East Africa. The former have decidedly more buffy hind feet, but with regard to the general colour of other parts I cannot see any remarkable difference. My specimens from the localities mentioned above are just as brown as those from Kilimanjaro.

Arvicanthis pumilio diminutus THOMAS.

THOMAS: Proc. Zool. Soc., London 1892, p. 551.

The only locality where this pretty Mouse was trapped (in 3 specimens) was at Escarpment station.

In one of the specimens the fulvous suffusion of the lower side is stronger than in the others.

Lophiomyidae.

Lophiomys ibeanus THOMAS.

THOMAS: Ann. & Mag. Nat. Hist., 1910, Ser. 8, Vol. VI, p. 223.

When passing the place called Blue Post at Thika river the 2^d of April 1911, I had the pleasure of seeing a living specimen of this rare and strange-looking rodent in the possession of Mr. HENDERSON, then in charge of the hotel there. Some few days later when Mr. HENDERSON was on his way home to England the *Lophiomyis* died in Nairobi, and he then kindly presented the animal to me because he had heard me express my interest in it. This specimen had been caught at Mau Escarpment, as I was informed. According to THOMAS (l. c.) this place should be the type-locality for *L. ibeanus ibeanus*. The present specimen appears, however, to be larger than the typical race is said to be. The upper length of the skull from tip of nasals to back of interparietal is 64.2 mm. (60 in *L. ibeanus ibeanus* and 62 in *L. i. hindei* according to THOMAS), and the greatest breadth of the skull is 42.3 mm. (38.5 in *L. i. ibeanus*, and 42.5 in *L. i. hindei*). The upper molar series measures, however, only 13.5 mm. and the length of the palatine foramina is only about 11 mm. In consequence of these dimensions, and because the premaxillæ are heavily granulated, I think, this specimen must be referred to *L. ibeanus*, and not to the somewhat larger Abyssinian *L. bozasi*, although the frontal region of the skull is somewhat concave as it is said to be in the latter. The great size of the skull is, however striking, the more so as the specimen, although adult, cannot be very old, because the sutures on the top of the skull are quite conspicuous, and it is a female just as the types as well of *L. i. ibeanus* as of its subspecies *hindei*. The length of the alcoholic, skinned specimen from occiput to root of tail is 25 cm. and the length of the tail is 19 cm.

¹ Ann. & Mag. Nat. Hist., Ser. 8, Vol. VI, p. 313.

Considering that the difference in the size of the skull between this specimen and that of the type of *L. i. hindoi* is just as great as between the latter and *L. i. ibeanus*, although all are of the same sex and adult, it appears probable that these animals vary considerably in size individually. In such a case it appears hardly possible to maintain *L. i. hindoi* as a subspecies as it only differs in size.

Pocock has quite recently¹ discussed the peculiar arrangement and coloration of the hair of *Lophiomys* and arrived at the plausible conclusion that the black and white pattern must make the animal conspicuous in the dusk. Pocock regarded thus *Lophiomys* as a 'selfadvertiser', and believed it to be protected by a most peculiar but indescribable smell, which the author quoted had felt emitted from the specimen examined by him. To this may be mentioned that the living animal seen by me did not produce any perceptible odour, nor did my taxidermist Mr. A. Jansson perceive any such when he skinned the dead animal. The skin has a somewhat musky smell but by far not so strong as that of many Shrews for instance. The body preserved in alcohol has no peculiar smell.

Mr. HENDERSON's specimen was quite tame (which perhaps explains that it did not affect our olfactory organs). He could handle it just as he liked, and he lifted and carried it by getting hold of the long hair of its back. When put on a table for instance it slowly walked a round without any attempt to slip away, and it did not try to bite.

It was fed on carrots, while in the possession of Mr. HENDERSON, and it appeared to like that diet.

Spalacidae.

Tachyoryctes splendens ibeanus THOMAS.

THOMAS: Proc. Zool. Soc., London 1900, p. 179.

This Mole-rat is rather common at Nairobi where several specimens were obtained. One specimen was also caught among grass at a small dry rivulet on the open plains some distance north east of Nairobi. Especially the blackish young, or half grown young animals were often seen among the vegetation at the road side even in daytime.

When compared with the Mole-rats caught at Meru boma the specimens from the neighbourhood of Nairobi are easily recognized on the shape of the nasals which are rather evenly tapering backwards, as is well illustrated by THOMAS' figure of the type (l. c. p. 180). The same bones of the Meru specimens are comparatively broader behind and do not taper so much. A skull of the latter kind was therefore sent to British Museum for comparison, and Mr. GEY DOLLMAN kindly replied that a long series of specimens from Kenia and the Igambi Hills exhibited a considerable variation in the form of the nasals. In consequence of this the *Tachyoryctes* of Meru boma as well must be considered to be *splendens ibeanus*.

¹ Proc. Zool. Soc., 1911, p. 946—948.

A series of eleven specimens from this locality display a rather great variation with regard to colour as well. The young are, of course, black, but the adult have sometimes hardly any black at all on the head, and sometimes an old specimen with well developed crests on the skull has the entire head black. There is also a nearly albinistic specimen in the collection. This one is whitish ash-coloured with pale buffish tips to some of the hairs.

Around Meru boma these Mole-rats were very common in the shambas.

Bathyergidae.

Heterocephalus glaber progreiens n. sp.

This peculiar Naked Rat was observed in the thornbush country north of Guaso Nyiri, and four specimens were captured. When one sees this quaint and naked being the first impression is that it is the newborn young of some large rodent. The nakedness, blindness, comparatively small feet but big head make it look like a foetus. But the ferociousness with which it at once bites anybody or anything that touches it, soon takes away the belief in its youth and harmlessness. It lives entirely under the ground, and its burrows appear to be long but mostly situated rather near the surface. Here and there the burrow has openings through which the earth is thrown out rapidly in thin squirts. The result of this is small hills which DRAKE-BROCKMAN very properly with regard to their appearance compares with miniature volcanoes. Often quite a number of such little hills are situated near each other in rows along the burrows. It appears most probable that the animals do most of the digging with their powerful incisors as the feet look very weak. The throwing out of the earth is of course effected with the hind feet, which are especially adapted for that. The outer appearance of these peculiar animals has been repeatedly described by RÜPPEL,² OLDFIELD THOMAS,³ PARONA & CATTANEO⁴ etc.

One of my specimens is figured Pl. III, fig. 2, and the head of the same, a little enlarged, is seen on the same plate fig. 3 from its anterior end. These two figures show the arrangement of the hair and bristles on the head and body, while the peculiar fringes on the feet are elucidated by fig. 4 which shows a hind foot seen from above, twice enlarged.

In the interior of the mouth as well some scattered bristle-like hairs are found on the insides of the cheeks in front of the molars as may be seen on Pl. III, fig. 5. In this figure as well the structure of the palate is shown. It differs from that of *Fornarina phillipsi* THOMAS in having only two pair of palate-ridges, the anterior pair of which is confluent, while *Fornarina* to judge from the figure communicated by THOMAS (l. c. Pl. LIV, fig. 2) has four.

¹ The Mammals of Somaliland, London 1910, p. 137.

² Mus. Senckenb. Abh., Bd. III, Frankfurt 1845, p. 99—101.

³ Proc. Zool. Soc., London 1885, p. 845—849.

⁴ Ann. Mus. Civ. Genoa, Ser. 2, Vol. XIII, p. 419—445.

The dimensions of my largest and next smallest specimens are as follows:

Length of head and body	105 mm.	86 mm
" " tail	39 "	36
" " hind foot	20 "	19
" " forearm and hand	27,5 "	23,5
" " head	about 33 "	23
Distance from muzzle to ear	22,5 "	17,6
" " " " eye	12,5 "	9,2
" " " " eye to ear	10,5 "	8,1
Skull:		
Occiput to tip of nasal	23 "	18,4
" " " incisors	28,2 "	22,1
Condylbasal length	26 "	20,6
Condyle to incisor tip	27,8 "	22
Greatest breadth	20,2 "	15
Least width behind orbits	6 "	5,7
Mastoid breadth	13 "	12
Length of nasals	9,2 "	6,6
Combined breadth of nasals in front	4,5 "	3,7
Combined breadth of upper incisors	3,3 "	2,4
Diastema	10 "	7,5
Length of upper molar series	3,3 "	3,4
Length of palato	13,6 "	11,7

As these figures indicate there is a considerable difference in size between the specimens collected. This stands of course in connection with difference in age, but even the smaller and younger of these two specimens measured above has a plainly developed lambdoid crest. Both have three molariform teeth on either side of both jaws. As all my specimens are collected in the same locality there cannot, of course, be any doubt about their representing the same species. But it is not quite so easy to tell at once which. *Fornarina* is, of course, excluded in consequence of the number of cheek teeth. Of the three species of *Heterocephalus* described, one, viz. *H. ansorgei* THOMAS,¹ is very much smaller, if the type has been fullgrown, and its cheek-teeth are smaller. *H. dunni* THOMAS² which is a large species, is said to have a short low coronoid on the lower jaw as *Fornarina*, and also the zygomata very boldly expanded as much anteriorly as posteriorly. — In my specimens the coronoid is high and slender, very different from the type exhibited by *Fornarina*. The shape of the zygomatic arches is probably something intermediate between that exhibited by *H. glaber* as represented by RÜPPEL's figure³, and *H. dunni* as described by THOMAS (l. c.). It is thus comparatively more bowed out in its anterior portion than in the former species, but the zygoma is conspicuously more expanded behind than in front.

¹ Proc. Zool. Soc., London 1903, p. 336.

² Ann. & Mag. Nat. Hist., Ser. 8, Vol. IV, 1909, p. 109.

³ Mus. Senckenb. Abhandl., Bd. III, Frankfurt 1845, Taf. X, Fig. 3 a, b, c.

In the smaller and younger specimen the ascending processes of the premaxillaries extend further backward beyond the end of the nasals, but in the largest (=oldest) specimen the nasals reach about as far back as the premaxillaries. The former condition prevails in *Fornarina* which thus in this respect represents a more juvenile stage than *Heterocephalus*.

If RÜPPELL'S figure of the skull of *H. glaber* is correct my specimens differ widely from that species with regard to the situation of the palatine foramina which in the former are situated chiefly in front of a line drawn across the palate as a continuation of the ptheriperic contour of the zygomatic arches. In my specimens these foramina are situated behind such a line in the same way as in *Fornarina* according to THOMAS' figure¹ of the latter. But, although the situation of these foramina thus far is alike in my specimens and in *Fornarina*, there is another quite important difference between them. In the latter, according to THOMAS' figure, the suture between the premaxillary and the maxillary extends across the palate at the anterior end of the palatine foramina, but in my specimens the corresponding suture is seen at the posterior end of the foramina in question. These foramina are also very small in my specimens their length being about 1,5 mm.

Concerning *H. dunni* THOMAS writes as follows: "Incisors enormously thick and large, far heavier than in any other member of the group." — — — "combined breadth of upper incisors 3.0. — — — In my largest specimen the incisors are still larger and heavier measuring as much as 3.3 mm. As the type of *H. dunni* is said to be old and the length of its head and body is about 10 mm. more than that of my biggest specimen this difference in the combined breadth of the upper incisors appears to be of importance. The size of the incisors in *H. glaber* appears to be rather constant and not increase much with age, because THOMAS says that the study of immature and old specimens of that species has shown to him "that no such development of the incisors occurs in old age in that animal". That is, the incisors do not increase in size with age so that they become so big as those of *H. dunni*. In the present specimens on the other hand, a very striking increase in size of these teeth takes place. In the smallest and youngest of my specimens the combined breadth of both incisors is only 2.1 mm., in the next 2.4 mm., in the third 2.8 mm., and in the biggest 3.3 mm. If only one of these younger and smaller specimens, and the biggest had been collected, it would have appeared rather probable that these specimens represented two different races, a small and a large, because the dissimilarity is so very obvious and even the smaller looks rather adult thanks to its lambdoid crest. With the intergradation exhibited by all four specimens it is impossible to believe in such a theory, and the gradual development of the incisors is quite clear. But then, when nothing of that kind of development is to be seen in *H. glaber* as quoted above, these specimens cannot be referred to that species. Other differences from the same, in addition to different shape of the zygomata and the situation and size of the palatine foramina, are the greater length of the nasals, the longer diastema and the greater occipitonasal length of the skull.

¹ I. c. Pl. LIV, fig. 4.

From *H. dunni* the largest of my specimens, which with regard to size and age comes nearest to the type of the species quoted, differs in the following points in addition to those already mentioned above. The skull of my specimen is larger in all dimensions. For comparison may especially be mentioned:

	<i>H. dunni</i>	<i>H. from Gusso Nyiri</i>
	Male	Female
Condylobasal length	23	26
Least width behind orbits	5,5	6
Combined breadth of upper incisors	3,0	3,3
Dianstoma	7,7	10
Length of upper toothseries	2,0	3,3

Considering these facts it does not appear possible to identify my specimen with any of the three species of *Heterocephalus* described, but as they undoubtedly all are nearly allied I prefer to use the new name which must be given only in a subspecific sense.

The cheek-teeth of the type of this new *Heterocephalus glaber progrediens* are quite simple in the upper jaw. In the lower jaw remains of a lateral enamel-fold is seen on the first and last of these teeth on one side. In the younger specimen the two anterior teeth of the upper jaw show a deep lateral fold which, however, in the anterior tooth by wearing already is detached from the outer enamel-layer and appears as an inner central ring of enamel. In the middle tooth the lateral connection of this fold still is open as in RÜPPELL's type of *H. glaber*. The third posterior tooth is not yet so much worn as to show the pattern. All the three cheek-teeth of the lower jaw have a deep fold as well on the lateral as the median side which meet in the middle of the tooth. The fold of the lateral side of the first tooth is, however, on the verge of disappearing.

Pedetidae.

Pedetes surdaster THOMAS.

THOMAS: Ann. & Mag. Nat. Hist. 1902, Ser. 7, Vol. IX, p. 410.

This species was said to be not uncommon on the plains outside Nairobi, but as I did not do much collecting on the steppe, I did not obtain any specimen myself. A fine specimen was, however, presented to me by Mr. HOBLEY.

Hystriidae.

Hystrix galeata THOMAS.

THOMAS: Ann. & Mag. Nat. Hist. 1893, Ser. 6, Vol. XI, p. 230.

The African Porcupines can naturally be divided in two groups according to the different development of the nasals, viz. a comparatively northern, the *cristata*-

galeata-group with long nasals which as a rule have a great relative breadth also in front, and the southern *africæ-australis*-group with shorter nasals which are much narrower in front than behind.

The Porcupines obtained by this Expedition belong, as could be expected, to the former group and to *Hystrix galeata*, which species, however, has been subdivided into some geographical subspecies by the present writer¹ and FERD. MÜLLER.² Of these subspecies *H. g. ambigua* LÖNNBERG is easily recognized on the shape and proportions of its nasals, the breadth of which at the front end of the nasopremaxillary suture is only 57 % of their breadth at the posterior end of the same suture etc.

FERD. MÜLLER has named not less than three new subspecies of *H. galeata*. In doing so he lays great stress on the fact that the skull of the type of *H. galeata* THOMAS (which was a young or semiadult specimen in which the last molar is not yet in use) has greater posterior interorbital width (at rudimentary postorbital processes) than anterior interorbital width (at edge of lacrymals). MÜLLER regards this as such a valuable characteristic that he divides the subspecies of *H. galeata* in 2 Gruppen — — einmal in solche, deren grösste Frontalbreite hinten, an dem rudimentären processus postorbitalis liegt, und sodann in solche bei denen die Breite der Frontalia vorne, an der Wurzel des Lacrymale, am grössten ist. To the first group belongs (the type of) *Hystrix galeata* THOMAS, to the second the already mentioned *H. g. ambigua*, and MÜLLER'S *H. g. conradsi*, *H. g. lademanni*, and *H. g. lönnbergi*. Concerning the three latter not much information is given. *H. g. conradsi* is said to have the width of processus nasalis præmaxillaris 12—14 mm., and the thickness of arcus zygomaticus maxillaris 3,5—4 mm., while the corresponding measurements of *H. g. lademanni* are 16—16,5 and 7 mm. respectively. With regard to *H. g. lönnbergi* the reader obtains no other information than about those points by which it differs from *H. g. ambigua*, but not how it is to be distinguished from *H. g. conradsi*, and *H. g. lademanni*, while the difference from the typical *H. galeata* shall consist in the anterior interorbital breadth being smaller than the posterior.

The question is now whether these interorbital measurements and the relation between them is constant or not? That the interorbital measurements themselves are not constant is easily ascertained by examination of some *Hystrix galeata*-skulls of different age. It appears also almost certain that the anterior interorbital width increases more with age than the posterior to judge from the general development of the skulls. In two specimens from Kilimanjaro, for instance, the anterior measurement is in the younger 69 mm. and in the older 75 mm. while the posterior measurements are resp. 67,7 and 71,5 mm. The difference between the two dimensions is thus in the younger only 1,3 mm. but in the older 3,5 mm.³ It appears therefore probable that in still younger skulls this difference may decrease still more, or even be inverted.

The variability of these dimensions has also been very plainly proved by FERD. MÜLLER himself concerning the by him described *H. stegmanni*.³ The difference

¹ Mammals, Schwed. Zool. Exp. nach dem Kilimandjaro und Meru. Upsala 1908, p. 29.

² Sitzber. Ges. Naturforsch. Freunde. Berlin 1910 p. 314—315.

³ Arch. f. Naturgesch. 76 Jahrg. 1910. Bd. I, p. 182.

These measurements indicate a very great individual variation in several respects. The most puzzling is perhaps the great difference in the relation between the parietal and frontal bones. In the Itiolu-specimen, for instance, the parietal is extremely short and the frontal extremely long, and in the Ntebbe-specimen the opposite condition prevails. But a comparison shows that the Fort Hall-, the Kili-manjaro-, and the Northern Guaso Nyiri specimens with increasing resp. decreasing measurements gradually fill up the gap. A greater amount of material would no doubt prove this still better, but at the same time how very difficult it is to base new species and subspecies of Porcupines on cranial measurements.

This variability is due to the comparatively long time during which each individual Porcupine continues to grow, and the great changes to which the skull is subjected during its growth. The factors at work are the development and extension more and more backwards of the air sinuses, and the development of the musculature which causes an increased growth and transformation of those parts of the skull with which it stands in connection. Through the influence of the musculature (*m. temporalis*) the parietal area is expanded and the lambdoid crest, so to say, moved backwards more in some specimens than in others.

Both my specimens have the for *H. galcata* typical great height of the skull measuring from the palate between the first molars resp. 76 and 77 mm. The nasal processes of the premaxillaries are also as in the typical *H. galcata* very broad measuring at the middle of the nasopremaxillary suture resp. 18.5 and 20 mm. The maxillary portion of the zygomatic arch is inflated by the continuation of the air-sinuses into it, and its least width amounts therefore to about 15 mm.

With the great dimensions of the skull of *H. galcata* a considerable bodily size is united. My specimen from Itiolu river measured when freshly killed 80 cm. from snout to vent in a straight line.

The Porcupines are rather common in certain parts of Brit. East Africa. In the surroundings of Nairobi its scratchings in the earth, and excrements were often observed. Now and then a dropped quill was found. At Escarpment station the Kikuyus complained about the damage the Porcupines did in the »shambas» chiefly on the potato-crop. But although I promised a high reward, the natives said they could not catch any. In consequence of their nocturnal life and their habit of remaining in their burrows over daytime Porcupines are very seldom seen. His Excellency Governor F. J. JACKSON told me that during 16 years residence in East Africa he had not seen any living Porcupine.

The specimen which was caught by this expedition (Pl. VI fig. 2) on the grass-steppe between Luazomela and Itiolu rivers had evidently intended to sleep over the day under an acacia-bush from which it ran out when some of the »boys» of the safari passed. It was then chased and clubbed. One day when stalking Buffaloes in a thornbush-patch south of Guaso Nyiri not far from the ford on the Marsabit-road I ran across the remains, mostly quills, of a Porcupine which evidently had been eaten by some carnivorous animal. My gunbearers declared with great certainty that it was the doing of a »Simba» = Lion.

***Hystrix galeata somalensis* n. subsp.**

A couple of years ago I had the opportunity of studying with the kind permission of my friend OLDFIELD THOMAS the material of Porcupines in British Museum Nat. Hist. I found then among other things that in Somaliland is to be found a Porcupine which is much smaller than *H. galeata* of the surrounding countries, British East Africa, Abyssinia, and Eritrea. This small Somali Porcupine is represented in British Museum by two specimens both of which are old viz. a male (n:o 6, 5, 4, 9) and a female (n:o 6, 5, 4, 10) from Burao.

The measurements of these specimens are as follows:

	mm.	mm.
Basiscranial length	125	132
Distance from occipital crest to tip of premaxillary	138	149
Parietal length mesially	33	32
Frontal	24	32
Nasal " "	85	87
Combined breadth of nasals at posterior end of nasopremaxillary suture . . .	56	63
" " " " " anterior " " " " . . .	35	38
Width across postorbital processes	61	68

These measurements prove that, taken as a whole, the skull of the Somali Porcupine even when fullgrown and old is smaller than the smallest male and semiadult skulls of *H. galeata*, and it thus deserves to be regarded as a separate race.

In the thornbush country north of Guaso Nyiri where the fauna also in many other respects resembles that of Somaliland proper, I was fortunate enough to obtain a Porcupine which our native guide speared not far from the waterplace called Njoro, situated about 1° N. lat. This was an adult but not old female in which the last molar is in use but not much worn. The premolar has not yet been changed. Although the posterior portion of the skull has been broken by the spear it is quite clear that this specimen belongs to the same race as those from Burao in British museum, as the following measurements indicate.

Length of nasals mesially	83 mm.
Combined breadth of nasals at posterior end of nasopremaxillary suture . . .	54
" " " " " anterior " " " " . . .	34,5

The length of the nasals is thus in all these three specimens measured shorter than the minimum in any adult *H. galeata*. The combined posterior width of the nasals lies within the limits of variation for *H. galeata*, but the combined breadth of the same bones anteriorly is smaller than in the species mentioned. It approaches by this *H. africa-australis* to some degree without, however, reaching the same but

being intermediate between that species and *H. galeata*. This can be illustrated by the following figures based on my own measurements. In *H. africanæ-australis* the anterior breadth of both nasals are from 52 to 60 % of the posterior breadth of the same bones. In the Somalirace the same relation is 60 to 63 % but in *H. galeata* above 70 %.

The nasal process of the Somali Porcupine is very broad and resembles that of *H. galeata*. It measures in my specimen fully 17 mm. The maxillary portion of the zygomatic arch is inflated by the air-sinuses and measures about 15 mm. across. The distance from lacrymale to the zygomatic suture is about 12 mm.

The upper incisors appear to be narrower than in *H. galeata* so that their combined breadth above the cutting-edge only measures 10 mm., while the same measurement in the *H. galeata* specimens of this expedition is resp. 12 and 13 mm.¹

With regard to exterior characteristics the differences between the Somali race and typical *H. galeata* are not very great. The latter appears, however, to judge from a comparison with four specimens to have more white in the crest, longer white tips to the quills of the rump, and the quills round the tail with the white dominating unlike *H. g. somalensis* in which the white tips to the quills of the back are decidedly shorter, and broad black rings to be seen also on the quills around the tail.

The specimen of *H. g. somalensis* obtained at Njoro was by chance found above the ground. It ran out from below a thornbush where it had intended to sleep over the day.

Leporidae.

Lepus victoriae THOMAS.

THOMAS: Ann. & Mag. Nat. Hist. 1893, Ser. 6, Vol. XII, p. 268.

This species is probably common in the neighbourhood of Nairobi, but as also the following species is found there it is difficult to say which of the two species is most numerous. I obtained specimens at a farm managed by Mr. HAMPSON some distance northwest of Nairobi.

A young Hare caught at Juja farm ¹⁸/₁ is also referred to this species.

They were usually found in open places under isolated or small groups of bushes or patches of plants. Old termite hills which had fallen down and were overgrown with coarse plants, a common feature in the landscape, were favourite places for the hares. They sit rather close and run with great speed.

Lepus crawshayi DE WINTON.

DE WINTON: Proc. Zool. Soc. London 1899 p. 416.

Specimens of this Hare were obtained not far from Nairobi on a grassy plain near the Limuru road, and on a steppe with rich growth of grass near Rooruka river.

¹ In not yet adult specimens of *H. galeata* I have seen this measurement only amounting to about 11 mm. but never so small as 10.

Hares were seen many times in the neighbourhood of Nairobi, at Juja farm, Blue Post, Kutu etc. but, as observed above, when specimens were not shot it is difficult to say to which species a running Hare belonged, although the difference in colour is considerable.

In addition to the difference of the pelage between these two Hares, the characteristics of the upper incisors pointed out by DE WINTON are very useful for distinguishing the two species. The combined breadth of the incisors at the cutting edge of *L. crawshayi* is only 5 mm. but in *L. victoria* the same dimension is fully 6 mm. In the former the grooves are quite filled up with cement so that the surface of the teeth looks flat. The cheek-teeth of *L. crawshayi* as well as smaller the length of the whole series measured at the worn surface of the crowns being about 12,2 mm. whereas the same dimension in *L. victoria* is 13,2—13,3 mm.

Lepus somalensis HEUGLIN.

HEUGLIN: Nov. Act. Acad. Leop. Car. Nat. Cur. 1861, Bd 82, p. 5.

The first locality where I made acquaintance with the long-eared Somali-Hare was in some dry thornbush-patches on the acacia steppe around Lekiundu river. When the expedition had crossed Guaso Nyiri to its northern side this Hare was found to be common in the thornbush which occupied the whole country there. They usually sat under acacia bushes and could often be seen at some distance, especially if they had raised their long ears. They were not shy, but did not sit so close as for instance *L. victoria* and *L. crawshayi*. On the other hand they did not develop such a speed as the two latter species. Sometimes a *Lepus somalensis* only comparatively slowly went away a little bit, if not too much scared.

The sexes appear to be of similar size. Out of my series of ten specimens the upper length of the skull, from occiput to tip of nasals, is 87 mm. in one male, 86,5 mm. in two females but 86 mm. in two other old males and an old female. The others are somewhat younger and therefore smaller, but the variation in size of adult specimens does not appear to be great.

Other measurements of a male and a female skull are as follows:

	♂	♀
	mm.	mm
Condylolncisive length	77	77
Zygomatic breadth	39	39,8
Oblique length of nasals	35,5	37,5
Breadth of braincase	29	28,7
Diaetema	23,5	24,5
Length of palate to inside of incisors	31	33,5
» » palatal foramina	21,3	23,3
» » molar series basally	15	15
Combined breadth of incisors at cutting edge	5,5	5,6

The length of the dry hind foot without claws is about $10\frac{1}{2}$ —11 cm. and the length of the dry ears $13\frac{1}{2}$ —14 cm.

Hyracoidea.

Procaviidae.

Procavia brucei borana LÖNNBERG.

LÖNNBERG: Ann. & Mag. Nat. Hist. Ser. 8, Vol. IX, p. 66.

This race of Hyrax belongs like its geographical neighbour *P. pumila rudolfi* THOMAS to the *Heterohyrax*-group, but it differs strikingly from it as well with regard to the colour of the fur as especially with regard to the shape and dimensions of the skull. Its fur is also longer. The average length of the hair appears to be in the present specimen about 16 mm. but it is an old female with somewhat worn fur. Many hairs attain a greater length, not counting the great number of long black bristles which are scattered all over the body, but especially numerous on the posterior part of the rump. The general colour of the back is umber brown, grizzled with whitish rings and blackish tips to the hair. The not visible parts of the underfur is basally smoke grey to pale slate grey, different in different places, externally dull cinnamon. The flanks are paler and more greyish than the back. The dorsal spot is large, its colour is cinnamon no 4 according to 'Repertoire de couleurs'. The face is much darker than the back, blackish brown. The superciliary band creamy white, and the lips white. The back of the ears grizzled of greyish white and broad dark brown tips to the hair. The sides of the neck are pale brownish grey, grizzled with blackish brown tips and rings to the hair. The underfur of these parts is whitish. The under side is creamy white, with a slight buffish tinge which is a little more pronounced between the fore limbs and in the anal region. Feet very pale yellowish grey with some longer dark brown hair.

Length of head and body about 42 cm.

Length of hind foot about 53 mm. Both these measurements are taken from the type which is an old female, stage VIII according to THOMAS' terminology.

If the skull of this Hyrax is laid at the side of that of *P. pumila rudolfi* THOMAS the difference is found to be very striking. The former is much more elongate, and, in spite of its much greater length, its width as well across the zygomatic arches as across the postorbital processes is not larger than the same of fullgrown specimens of *P. p. rudolfi*. The superciliary portion of the frontals is gradually raised a little towards the free margin over the orbit so that the forehead becomes somewhat concave. The nasals are comparatively long, rather broad posteriorly, but suddenly narrowed and provided with parallel side contours in more than half of the anterior part. The whole preorbital region of the skull is longer as well, as the tables of measurements indicate if compared.

chiefly consists of a comparison of the then new form, and *P. valida* (!) it gives comparatively little information about *Procavia thomasi*, and there are no skull measurements. I have therefore written to Professor MATSCHIE and asked him to kindly provide me with some skull measurements and some notes about the shape of the nasals and the condition of the posterior palate. Professor MATSCHIE kindly replied and gave the following information which proves that *Procavia thomasi* is quite distinct from *P. brucei borana*. As his notes may be of use for other authors I take the pleasure of publishing them here. —Die Nasalen [of *Procavia thomasi*] sind nicht plötzlich verschmälert, aber bei dem ♂ in der Mitte stark eingezogen. Am hinteren Gaumenrand sehe ich keine Höcker neben dem medianen Processus.²

The greatest length of the skull of a female in stage VIII from Gimirro is 82.4 mm., in a male and two females stage VII it varies from 86 to 89 mm. The basal length in the three latter is from 71 to 76.4 mm. The length of the nasals mesially is 17.7 in the oldest female, in the others 18.1 to 19.4 mm. The breadth of the nasals posteriorly is from 16 to 17.6, and in front 7.5 to 7.8 mm. The length of the molar series is 30.4 to 31.5 mm., of the diastema 10.3 to 11.7 mm.

These measurements indicate that *P. thomasi* is larger than *P. b. borana*.

The type specimen of the latter was shot in the afternoon ¹³/₂ 1911 when running along a rocky ledge in a small ravine just north of Guaso Nyiri about one days march to the east from the Marsabit road. Its distribution extends probably chiefly westwards from the locality mentioned because further east (below Chanler Falls and at Njoro) its place is occupied by a still smaller Hyrax.

Procavia pumila rudolfi THOMAS.

THOMAS: Ann. & Mag. Nat. Hist., Ser. 8, Vol. V, 1910, p. 202.

In the thornbush country north of Guaso Nyiri rocks of varying sizes from a small mountain to a rocklet are numerous, and as they are always very much weather-worn and full of cracks and crevices they offer very good dwellings for Hyraxes. They are also very often inhabited by such. At Njoro and in the thornbush country below Chanler Falls this small race is very common.

It is to great extent diurnal in its habits. If one carefully approaches some rocks inhabited by this species one may be sure of seeing several Hyraxes running about, or lying basking on the ledges. Others may be seen running back to shelter from the thornbush. When frightened they disappear, of course, at once, and even wounded specimens are lost if they are not killed on the spot. Only once I saw some of these animals run down from an acacia growing near their rocky refuge, and Mr. R. J. CUNNINGHAME told me that he one day had seen a Hyrax of this small kind with great dexterity move about in a frightfully spiny bush.

The colour of the fur agrees with THOMAS' description (l. c.) but some of my six specimens are darker and the dorsal spot varies from buff to rufous.

As THOMAS only has had an immature male at his disposal it appears of interest to communicate some cranial measurements.

	Stage VI ¹				Stage VIII	
	♂	♀	♂	♀	♂	♀
Craniobasal length	53,5	56	55,5	54,5	57	60
Condylbasal length	57,5	60	60	59	60,5	65,5
Greatest breadth	33,5	36,5	35	34,5	37,5	39,5
Upper tooth-row from front of p ¹ to back of m ²	23,5	24	22	22,5	22,5	22,5
Length of nasals mesially	11,5	13,5	12,5	13	13	14,5
Combined breadth of nasale posteriorly	14	15,5	14	14	14	16
Breadth across postorbital processes	25	27	26	26	27	30
Length of diastema	7	7	7,4	6,5	6,8	6,9
Distance from orbit to tip of premaxillary	17,3	17,8	18,5	19	18,3	19,5

These measurements prove that this little Hyrax is not far from fullgrown when it reaches stage VI according to THOMAS' terminology.²

In the fully adult specimens the hind margin of the palate is somewhat raised and swollen along either side, and this ridge ends in a kind of protuberance on either side of the central process fully separated from the same by a notch. This condition reminds about that described by WROUGHTON on the skull of the much larger *Procavia brucei hindi*.³ (Concerning *P. b. borana*, conf. above.) The nasals are short and broad, evenly tapering in front, not suddenly constricted and then with parallel margins as in the other Hyrax which also was found north of Guaso Nyiri but above Chanler Falls viz. *Procavia brucei borana*, which has been described above.

The fact that two small representatives of the *Heterohyrax* group are found so near each other without being separated by any physical geographical obstacle is of interest, the more so as analogous cases were found among the Baboons (conf. above) and Dik-diks (conf. below).

Procavia (Dendrohyrax) crawshayi THOMAS.

THOMAS: Proc. Zool. Soc., London 1900, p. 178.

An adult male (stage VIII according to THOMAS' terminology) was shot in the forest near Escarpment station. The colour of this specimen agrees exactly with the description of the type except that the belly is not deep buffy but buffish white. The lower side of the neck is more buffy. The head is perhaps also darker than that of the type specimen as the black in the grizzled parts is dominating over the whitish.

Condylbasal length of skull	90 mm.
Craniobasal length of skull	85,5
Greatest breadth of skull	47

¹ The first of these stand between stage V and VI as m² is in use but m³ not yet on a level with the bone.

² Proc. Zool. Soc., London 1892, p. 53.

³ Ann. & Mag. Nat. Hist., Ser. 8, Vol. V, p. 108.

Length of nasals mesially	22 mm.
Greatest breadth of nasals	17 "
Length of molar series	35 "
Greatest length of m ¹	5,5 "

The «Perere» as the Hyraxes are named in Kisuhili were very common near Escarpment station but as they are entirely nocturnal I only saw this specimen just before sunset one evening, and although I walked through the forest every evening as long as I stayed there trying to obtain some more it was without success. In night-time they made an awful noise, especially about 9 o'clock, and produced very strong creaking and grating sounds, and now and then some ghastly screams, but they were then impossible to detect among the foliage and branches of the trees. We heard «Perere» as well in the forest of Kenia, and one day on an open place I saw at some distance a young specimen scramble down a small tree and disappear in the bushes.

Proboscidea.

Elephantidae.

Elephas africanus cavendishi LYDEKKER.

LYDEKKER: Proc. Zool. Soc., London 1907, p. 395.

The African Elephant has during the last years been subdivided in a number of subspecies. The material on which this proceeding has been based has not been very rich depending upon the bulkiness and the difficulty of procuring it. It has been principally the shape of the ear which has given the characteristics used for the separation of the subspecies. An Elephant (Pl. VI, figs 3 & 4) which I shot ¹⁸ 1911 at the waterplace called Njoro in the thornbush country north of Guaso Nyiri and Chanler Falls is in this respect most similar to LYDEKKER's *Elephas africanus cavendishi*. The type locality of this race is «the Lake Rudolph district» and this stands in good correspondence with other faunistic features of the country where I obtained my specimen.

The great transverse diameter of the ear is an especially prominent characteristic of *E. a. cavendishi*. This measurement was in LYDEKKER's type 87,5 cm. and in my specimen somewhat more still viz. 100 cm. from the posterior margin to the fold at the ear-opening. As can be seen on the photo (Pl. VI, fig. 3) the ear-lappet is well developed, but hardly so long as in the Aberdare Elephant (*E. a. peeli*).

The following measurements were taken on the just dead animal:

Distance in a straight line from anus to fold at ear opening	300 cm.
Distance from this fold to posterior corner of eye	52 "
Distance from posterior corner of eye to the place where the tusk projects free from the surrounding gum	52 "
Distance from the latter place to the end of the trunk	225 "

Girth of trunk 70 cm. from the base	200 cm.
" " " 50 cm. further down	75
" " " 50 " " "	53
" " " at the end	40
Height of animal at the sacral region	290
Breadth of sole of hind foot	50
Length " " " " "	52

The height at the shoulders could not be measured because I could not straighten the forelegs of the animal.

The iris was 23 mm. and the pupil 11 mm.

Twelve centimetres above the posterior corner of the eye the orifice of a gland opened with a duct about wide enough to admit a common lead pencil. But it was almost plugged with a number of broken thorns of acacias and similar small twigs. I heard from CUNNINGHAME that the Elephants, so to say, perspire from this gland sometimes so that a dark and damp spot is seen on the forehead round the orifice. A similar statement has also been made by F. C. SELOUS¹ who observes that such a wetting of the skin around the gland always appears after a run in the hot sun.

In the Indian Elephant the corresponding gland has been regarded as a scent gland which principally works at the rutting season.

As I have material of this gland preserved I hope to be able at another opportunity to publish some notes of its structure which may give some information about its function.

This Elephant was a middle aged and medium sized animal, a herd bull so to say. The testes contained ripe sperms which have been described by G. RETZIUS.² They proved to be even comparatively speaking very small, ungefähr von der Grösse derjenigen des Menschen, welche schon an sich als klein zu betrachten sind (l. c. p. 3).

The propagation of the Elephants at this place appeared to be normal as the females seen were accompanied by young. Once about a dozen female Elephants with calves of varying size passed our camp. At another opportunity SjöGREN and CUNNINGHAME came unawares near two females with small young. The Elephants charged with a squeal and CUNNINGHAME had to shoot one of them in self defense. To judge from the spoor the bulls went mostly single or by twos. Some tracks indicated animals which were larger than the one shot by me.

When one sees the leafless dry thornbush it does not look inviting to any animal, and it appears impossible that such animals as Elephants shall be able to find their food there. The question is near at hand, what can they feed on? If one follows a fresh spoor of an Elephant it is soon seen that he is not very particular in this respect. Sometimes he has twisted off the top of a bush and put in his mouth chewing it all but dropping pieces of twigs now and then. Sometimes he has torn off a branch of an acacia (those with greenish yellow bark appear to be preferred) thick as an arm, and it all wanders the same way under the powerful

¹ Conf. LYDEKKER: The Game Animals of Africa, p. 16.

² Biol. Untersuchungen N. F., Bd. XVI, p. 3.

molar apparatus. The nuts of the doum palms are often eaten, but he does not appear to be able to crush them as they are found in great number whole in the droppings. Sometimes comparatively big trees are uprooted and pushed down to give the Elephants access to the branches. An acacia of as large size as these trees attain in the thornbush and which has been broken down by Elephants is shown on Pl. VII, fig. 1. It happens at such occasions that the Elephants break, their tusks and a big piece of ivory was found by one of our boys. A rather big Elephant with only one tusk was seen by CUNNINGHAME at Njoro.

The Elephants probably did not drink but every second night at Njoro to judge from the spoors at the waterholes, but it might be possible that they knew more than one water-place so that they alternately visited different pools. It appears, however, certain that they can provide themselves with so much water that it lasts for more than one day. I make this conclusion in consequence of an observation on the Elephant which was shot at Njoro. It was killed about 12 at noon and had probably not drunk since the evening before as it took us between 5 and 6 hours to follow the spoor and the Elephant had walked slowly hither and thither feeding, and was resting under an acacia when we first saw him. Nevertheless its ventricle was found to contain great quantities of water which was as pure as the water in the pool from which it originated. The water in the ventricle was not mixed with the food material, although the Elephant as already mentioned had been feeding almost all the way from the water hole to the place where it was shot. This fact that the water contained in the ventricle can be kept in some way or other without mixing with the food material explains that they can put the tips of their trunks into their mouths, and drawing about a bucket full of water from their stomachs, squirt it over their shoulders (SELOUS as quoted by LYDEKKER l. c. p. 15).

The Rendiles told us that the Elephants probably would remain near the waterholes at Njoro during the dry season but go away when the rains begun.

It has been repeatedly stated by sportsmen that the eye-sight of the Elephants is weak. I had the good opportunity of verifying this myself. The locality where we found my Elephant was covered with scattered bushes most of which were only about 120 cm. in height. We were thus well visible over the tops of these bushes, especially to an eye situated so high above the ground as that of an Elephant, but he did not see us, although we did not crouch except when we moved. And it was no difficulty to reach within about 70 m. from him.

It has been stated in the literature by A. H. NEUMANN, and perhaps by others as well, that the right tusk is almost always more worn than its fellow. I can make the same statement about my own specimen. Its right tusk is more worn and somewhat chipped at the end, while the left is intact (Pl. IV, fig. 3). An Elephant skull in this museum from Cameroon, thus probably of *Elephas afr. cyclotis*, has the right tusk badly broken while the left is in good condition. This is, no doubt, a result of the same agency, viz. the propensity of the Elephants to use the right tusk more than the left. Although this is not a rule without exceptions (e. g. a South African Elephant in this museum has both its tusks just as perfect), it is of interest

because it is evidently something analogous to the preponderant use of the right side of the head in Giraffes as set forth at another place in this memoir, and also to the right-handedness of man.

In the primeval forest of Kenia Elephants are to be found but whether of the same race or not is uncertain. These forest Elephants may belong to the Aberdare race (*E. a. peeli*). When passing through the forest region between Embu and Meru we saw tracks of Elephants several times, and on the way back we were so close to them that we heard them break branches etc. At an open place in the forest at an altitude of 2,500 m. the Elephants appeared to have a favourite resort between two small rivulets. There were spoors everywhere and at two different places around some water holes the probably alkaline earth had evidently been dug up by the Elephants with their tusks as the marks plainly showed. Close above this place rose a hill so steep that it was connected with difficulty for a man to ascend it, but the numerous Elephant tracks proved that these animals often passed up and down there. The »steps» in these tracks were often 80 to 100 cm. high above the next.

The Elephants ascend on Kenia to, and even above the bamboo region as the spoors indicate. At an altitude of 2,700 m. where the temperature at sunrise only was + 1° C. the Elephant spoors were numerous. These animals are thus not so susceptible to a low temperature as is generally believed. But when the rainy season sets in, I was told, that the Elephants descend to the shambas in the cultivated region. »They do not like the dripping from the trees.»

In the Kenia forest I saw in several places the ingeniously arranged pitfalls in which the Wandorobbos catch Elephants. They were dug in the paths of the animals and often with great cunning, between two big trees, in a curve of the path etc. to make it more difficult for the Elephants to avoid them. They were deep but so narrow that if an Elephant fell into such a pitfall he should be jammed in by his great weight so tightly between the walls that he could not move, and thus not be able to work his way out again.

Perissodactyla.

Rhinocerotidæ.

Rhinoceros (Diceros) bicornis LIN.

The Rhinoceroses were formerly common over great parts of British East Africa, but it is now exterminated, or nearly so, near all settled districts and roads along which there is any regular traffic, or where too often hunting parties are going in search of game. I saw, however, several on the acacia steppe south of Guaso Nyiri, and in the dry thornbush country north of this river they were found to be rather

numerous in certain localities as well as on the southern side of the river below Chanler Falls. In the dry country there numerous game paths lead to the river, and in the dust of these paths the spoor of Rhinoceroses were a regular feature. Probably many of these paths were just the products of the more or less regular walk of the Rhinos between their pasture-lands and the water. In day-time the Rhinoceroses are very seldom found near the river. As a rule they are met with at a distance of from 5 to 8 kilometres, perhaps more, from the water. Their chief food appeared to be a low scrub. They were found not only on the flat country but sometimes on the mountain slopes in the bush among rocks and boulders where one hardly could imagine that such a bulky and clumsy-looking animal would be able to find its way.

Here and there along the paths of these animals such places are seen where they are used to deposit their droppings and then scatter them. Such places are usually situated at a bush which as a rule has been broken and kicked to pieces, and a big hole is scooped up in the ground. It is sometimes stated in the literature that the scattering of the dung is done with the horn. Although I never have seen a Rhino at work it appears to me quite clear that at least most of it is done with the feet to judge from the deep furrows radiating from the hole and which exactly fit to the breadth of feet and in which even toe marks may be seen.

It is very difficult to explain how such a habit could have originated and become fixed, for it can impossibly be in any way useful to the animal now and thus be explained by natural selection. It might, however, be an inheritance.

The propagation of the Rhinoceros is, of course, slow, as usually is the case with such big animals, and it takes a long time before they reach full development. The fact that female Rhinoceroses often were seen in company with their not far from fullgrown young proves that several years pass between each period of gravidity, or parturition. On the other hand it is evident that the female Rhinoceroses in the districts visited do not suffer from barrenness because as a rule they were accompanied by a more or less grown up young. Sexual maturity is reached before the last molar has cut the gum as can be concluded from the fact that this tooth was not fully developed in a female which Mr. SJÖGREN shot south of Guaso Nyiri and which was followed by a good sized calf. On the other hand, a male Rhinoceros (Pl. VII, fig. 2) with only six cheek-teeth in use had comparatively very small testicles in which no ripe sperms were found, and it was thus not yet sexually mature. This animal measured from snout to vent in a straight line about 255 cm. (about 8½ English feet) or 295 cm. along the dorsal line. Its exact age is difficult to tell but it was probably several years old. It had like all other Rhinoceroses observed at close quarters numerous scars and ulcers (conf. the fig.) along the flanks. If those are obtained when the animals fight inter se or not is impossible to say, but it is most probable because hardly any other animal would dare to attack them, and the skin is too hard and thick to be deeply scratched by the thornbush. The Rhinoceroses were found to be infested by ticks of the species *Hyalomma aegyptium* (L.),

Amblyomma hebraeum (Koch) and *Dermacentor rhinocerotis* (DE GEER).¹ In the ventricle were found a few larvæ of some *Oestridæ* but they were too young to be determined according to Prof. SJÖSTEDT.

The Rhinos in the Guaso Nyiri district had all, as far as could be observed, small horns, the front horn measured along the anterior curve in those shot only about 36—40 cm.

According to several observers the Black Rhinoceros of the Somali countries shall be smaller than those in other parts of Africa, and a subspecific name *somaliensis* was created in the year 1900 by Count J. POTOCKI. DRAKE-BROCKMAN in his book about the Mammals of Somaliland² says "It has been said that it [the Rhinoceros of Somaliland] is smaller than the East African variety, but this is possibly due to the poorness of its food supply during certain seasons of the year in Somaliland. The horns certainly seldom grow to any great length" — (l. c. p. 106). The Rhinoceroses north of Guaso Nyiri in the thornbush country live under analogous conditions and they were certainly poor. The ribs could be traced through the skin (Pl. VII fig. 2).

Quite recently LYDEKKER has compared two skulls of DRAKE-BROCKMAN's Rhinoceroses from Somaliland with a skull from East Africa and found³ that the former differ by the narrower form of the whole upper surface, both at the interparietal constriction and at the orbital expansion. The figures of the Somali skull at the side of the East African skull show a striking difference in breadth. Only two measurements of the breadth of these skulls are recorded, viz. the breadth at orbits and the zygomatic width, in LYDEKKER's paper. For comparison the same measurements of two South African, two East African, and two skulls from Guaso Nyiri are recorded in the accompanying table of measurements. From this can be seen that LYDEKKER's East African skull must have been unusually broad as none of the 6 skulls now measured attain the same orbital breadth, nor zygomatic width.

	LYDEKKER's specimens		Guaso Nyiri		SJÖSTEDT's from Kilimanjaro	East Afr.	WAHLBERG's from Caffraria	SPARRMAN's from Capo
	Somali	East Afr.						
	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.
Length of upper aspect	57,5	55,5	56,5	54,5	56,5	57	56	55,5
Breadth at orbits	23,0	27,5	23,5	21,7	24,3	26	25,5	22,3
Zygomatic width	29,5	35,6	32,3	31	32	33,4	32,3	34
Least width of skull at the postorbital constriction	—	—	11,8	11,4	11,8	12,2	11,3	11,7
Width of across anterior horn boss	—	—	13	11,6	13,3	14,5	13	13

LYDEKKER's East African skull is thus beyond the average in these respects and accordingly, as this table of measurements indicates, the differences between *somaliensis* and other Black Rhinoceroses are not so great as will appear from

¹ Conf. L. G. NEUMANN: Ixodides. Ark. f. Zoologi Bd. 7 n:o 24 p. 4 Uppsala 1912.

² London 1910.

³ Proc. Zool. Soc. London 1911 p. 958—960.

K. Sv. Vet. Akad. Handl. Band 48. N:o 5.

his communication. Specimens with smaller orbital breadth than this *somaliensis* skull can evidently be found in different parts of Africa, and the zygomatic measurement is very variable.

The least width of the skulls at the postorbital constriction appears to be rather constant in the specimens measured by the present author, but unfortunately LYDEKKER has not given this measurement, nor that for the width across the anterior horn boss which latter is more variable in size. The exact condition of *somaliensis* in these two respects cannot be stated but the specimens from Guaso Nyiri do not appear to differ essentially from skulls from other parts of the continent. To judge from the present material there is thus no pronounced racial difference between the Rhinoceroses at Guaso Nyiri and those in East and South Africa.

There are, however, individual differences which appear very striking at the first look but prove to be less important when considered more closely. The breadth of the anterior end of the mandible is in South African specimens usually 5 to 5½ cm., and in the Guaso Nyiri skulls from 4 to nearly 5 cm. but in a skull from Kili-manjaro it is very broad, measuring 6.2 cm. and containing rudiments of four incisors. Such a thing has, however, only interest for the study of the individual variation but is then of importance.

It appears rather uncertain how long time this interesting remnant of a past fauna will be allowed to exist. The danger for extermination is the greater as the Rhinoceros is a slow breeder. It certainly has diminished rapidly in some districts, and it is deplorable that so many of these huge beasts are killed without reason. The Rhinoceroses have a bad reputation and this causes the death of many of their kind. "He is irritable, nervous, inquisitive, and churlish; unwary and wanting intelligence; unsympathetic as the dry, arid districts in which he lives", says F. VAUGHAN KIRBY in "The Great and small Game of Africa" (p. 37) about the Black Rhinoceros. With my little experience I cannot say anything against these attributes, but the three first of them he shares to some degree with not a few of them that speak ill about him, and, worse still, act accordingly.

It is much spoken of charging Rhinos, and it is, of course, an undeniable fact, as I have experienced myself, that some Rhinos do charge viciously. But it is by far the smallest number of them that are wicked. The greatest number flee at once when they get the wind of, or hear a man. Some may perhaps advance compelled by curiosity when they with their very bad eye-sight cannot make out what it is that has disturbed them. Others may, when they have been seared and rush away in the direction in which they happen to be headed, run so that they pass in proximity of man, and then it almost looks as if they intended to charge, although they are entirely innocent. Such incidents are, however, sometimes counted together with the real charges and the Rhinos are therefore by some people, who have witnessed real attacks, and by a number of nervous persons regarded to be much worse than they really are. Unfortunately some people also give vent to their hatred and shoot down the Rhinos in such a way that it must be termed wanton destruction and be most seriously condemned.

It is wonderful how often some people are charged by Rhinos, and in some cases it is no doubt a bona fide belief, and some people may perhaps have had worse luck with those creatures than others, or the Rhinos may be more fierce in some districts.

But on the other hand it is very easy to produce an effect which looks as if a Rhinoceros charged. A man approaches such an animal from its lee side and then he sends a native around to the windside. As soon as the Rhino perceives the taint it starts. If it runs up wind it charges the native, if in any other direction it charges somebody else!

Two Rhinoceroses are allowed on a license, and the charging ones are not counted. With the great number of sportsmen now visiting British East Africa two Rhinoceroses on each license is too much, and a not too small a fee ought to be paid for the killing of every charging Rhinoceros as well. I suspect that the number of such 'bad brutes' would not be so great then as it is reported to be now. It may appear hard that one should be obliged to pay for the killing of a charging dangerous beast, but those people who visit East Africa solely for the purpose of shooting and bringing home 'trophies' can no doubt afford to pay something for saving their lives, if need be.

In settled districts and such with a lively traffic the Rhinoceroses may be a troublesome nuisance, especially if they are numerous. But there are vast stretches of land in British East Africa, as well dry steppe as arid thornbush country, which never can produce any kind of crops, and where at most nomadic tribes may be able to feed their flocks. There the Rhinoceroses do no harm, and there, at least, they may be allowed to remain in reasonable number.

Although my experience about the Rhinoceros of East Africa, naturally enough, is not very great I think it may be opportune to mention as examples the behaviour of some of the Rhinos observed.

The 4th of Febr. we were going with our safari from Luazomela to Itiulu river across the open steppe. The wind blew transversely across our path from right to left. A female Rhinoceros with her calf seen on our left at a long distance, more than a kilometre, started to run like mad with raised tail as soon as the taint from the safari reached her. The calf followed close after her. A little later the same day a Rhinoceros was observed asleep under an acacia about, or rather less than 100 metres from our path. The safari was ordered to pass silently, but the Rhinoceros heard something and rose. As its visual power was not strong enough to give any information about what was going on, and it could not smell anything against the wind it laid down again quietly since it had tried to stare at us for a while. Similar incidents of both kinds were repeated several times during the expedition. In the thornbush north of Guasy Nyiri one day the grown up calf fled first and the mother followed, since they had stared at us a while.

Another day in the same country I passed a Rhinoceros with a nearly fullgrown calf at a distance of about thirty metres under the wind, and they did not perceive anything. At another opportunity I had shot a big Baboon on the slopes of a

mountain in the thornbush country. After the report of the shot we heard a couple of Rhinoceroses snorting in the bushes close behind us, but we did not see them. As we were on march I wanted the Baboon skinned at once so that the boys should not need to carry the heavy body. My gunbearers drove then the Rhinoceroses away by throwing some stones at them so that they should not disturb the skinner.

When we were camping at the water-holes at Njoro I went out as usual in the morning the 21st of Febr. to collect zoological material and had shot some small birds when a porter came running to me and said something about a »faru» (Rhino) which was about to kill the »nyumbis» (mules) and threatened the camp. I returned speedily and saw a Rhinoceros most peacefully browsing close to our mules on the other side of the dry river-bed at which we had our camp. The boys were of course very excited and wanted me to shoot. As the Rhinoceros had only small horns I did not want to shoot it, hoping to get a better specimen for the collection at another opportunity. I told the boys that, but said that if they wanted me to stay at the camp and protect them I would wait there till the Rhinoceros had walked away. When the boys found that they could not entice me to shoot, the »faru» suddenly lost all its dangerous qualities, and two negroes at once ran across the dry river-bed and drove away the Rhinoceros by shouting and throwing sticks at him, and he trotted off through the bushes with full speed.

A comparatively long experience of a similar kind proved to me that at least the greatest number of these animals, if not all, were rather good-natured, but by and by I learned to know that not all had the same kind disposition. One day when we were marching from a water-place Thera in the thornbush to Guaso Nyiri I went about half an hour in front of the safari with my gunbearers and an askari as guide. We followed a game path, and the wind blew across from left to right. Suddenly we perceived a Rhinoceros lying under an acacia to the right of our path. We were thus not able to pass without his noticing us. We stopped then and my gunbearer, Kongoni, advanced cautiously to the left of the path. As soon as the Rhino got wind of Kongoni he jumped to his feet and with a »locomotive snort» (as VAUGHAN KIRBY says) he went for the boy with full speed. When the askari, who also had advanced a little on the left side of the path, saw this, he shot (and hit the ground several metres from the Rhino). The Rhino changed then direction about 45 degrees towards the askari. I took then a step to be clear of a bush and be ready to shoot. The Rhino saw this movement, changed again his direction about 45 degrees and came towards me, but a bullet in his neck at rather close quarters made him swerve off. This was plainly a very deliberate charge, and the interesting thing is that the Rhino changed direction twice when he saw a new adversary.

A few days later, an afternoon when I was returning to our camp at Guaso Nyiri below Chanler Falls we found a Rhino lying close to the game path which we were following. The thornbush was rather thick there, and it would have been troublesome to make a detour around him. I tried therefore to drive him off by shouting at him. He started to his feet with a snort and as we were near him

he saw us and charged. I had thus to shoot, and he dropped on his knees stone-dead for a 9,3 mm. mauser bullet between the shoulder and the neck.

Thus, of all Rhinoceroses I had the opportunity of seeing only two charged, and the notes above may prove that it is not by far the rule that these animals are so bad-tempered as their reputation makes them.

Equidæ.

Equus burchelli böhmi MATSCHIE.

MATSCHIE: Sitz.-ber. Ges. Naturf. Freunde Berlin 1892, p. 131.

(*Equus burchelli grantii* DE WINTON.

DE WINTON: Ann. & Mag. Nat. Hist. 1896, Ser. 6, Vol. XVII, p. 319.)

This Zebra is common on the plains around Nairobi where not too heavily decimated by the settlers. At a place called Punda Melia, south of Fort Hall, which just has received its name (which means »zebra») from the former abundance of Zebras there, I saw only a single such animal on our way north, and six when we returned. On the acacia steppe north of Meru boma at Luazomela, Itiolu, and Lekundu rivers the Zebras were numerous, and at the latter locality they were often found in mixed herds with the large Grévy's Zebra without apparent rivalry. On the Athi plains they often are associated with Coke's Hartebeest and Gnu, at the northern acacia steppe with Oryx Antelopes.

North of Guaso Nyiri in the thornbush country I did not see any Zebras, but Mr. CUNNINGHAME told me that he had seen three one day. Although the Zebras occasionally cross this river — perhaps when scared by Lions, or if some other danger threatens them — it appears to constitute the northern limit of their distribution in this part of East Africa.

At a certain distance when the stripes are no longer conspicuous, a Zebra looks either very light grey almost white, or nearly black according to the different shade of light in which it stands. But a couple of the uppermost white stripes across the hind quarters shine much more brightly white than the others.

A considerable variation in the colour pattern of the Zebras of British East Africa has already been proved by J. A. ALLEN.¹ The same author has also stated the presence of shadow stripes in some specimens, even if they as a rule are absent. The difference between *E. b. grantii* DE WINTON and *E. b. böhmi* MATSCHIE appears thus to be very slight if any as already once before has been pointed out by the present writer,² and MATSCHIE's name is the older.

¹ Bull. American Mus. Nat. Hist. New York, Vol. XXVI, Art. XII, p. 160—165, figs 3—10.

² Mammals p. 32 in Wiss. Ergeb. d. Schwed. Zool. Exp. Kilimanjaro Meru von Y. SJÖSTEDT.

***Equus grevyi* OUSTALET.**

OUSTALET: La Nature 1882 X An. II semestre, p. 12.

(*Equus grevyi faurei* MATSCHIE?)

MATSCHE: Sitz.-ber. d. Ges. Naturforsch. Freunde. Berlin 1898 p. 170 & 180.)

It is rather uncertain, as well if the subspecific name »*faurei*» can be maintained, as, if this should be the case, by which characteristics the race provided with that name shall be distinguished. When the name was given MATSCHIE wrote as follows: »Wahrscheinlich wird *E. faurei* mit weisser Schwanzspitze sich von *E. grevyi* mit schwarzer Schwanzspitze gut unterscheiden und letzteres die Somali-Länder, ersteres die von mir als Rudolf-See-Gebiet zusammengefassten Gegenden bewohnen, zu welchen auch Schoa und das südliche Abyssinien zu rechnen ist.» At my request whether he later had obtained any more material, and whether he perhaps could add any more characteristics by which these two races could be separated MATSCHIE kindly replied that this was not the case. At the same time, however, he wrote: »Bei *E. grevyi* sind die dunklen Binden auf den Halsseiten hinter dem Kinn ungefähr so breit wie die hellen, bei *faurei* sind die weissen Binden etwa halb so breit wie die schwarzen.»

According to these two characteristics — the white tail-tuft and the relative breadth of the black stripes on the sides of the neck — the following figures in the literature among others belong to »*E. g. faurei*»:

Proc. Zool. Soc. London 1899 p. 714 & p. 825 (SCLATER);

Atti R. Accad. delle Science, Torino Vol. XXXVII (CAMERANO) figs. 1—5;

Proc. Zool. Soc. London 1900 p. 553 & p. 554 (RIDGWAY);

The Game Animals of Africa, 1908 p. 49 & 51 (LYDEKKER).

On the other hand the typical *Equus grevyi* would be represented by OUSTALET's two figures accompanying his first description of the species in »La Nature» Vol. X. 1882, and by SCLATER's figure in Proc. Zool. Soc. London 1882 p. 721. Concerning the origin of the specimen of *Equus grevyi* OUSTALET gives the following information: »Ce Zèbre qui a été capturé dans cette région de l'Afrique orientale qu'on appelle le pays des Gallas — — — Il a été offert en présent par S. M. Ménélek, roi de Choa à M. le Président de la République» — — — The latter figure as well has been prepared from a photograph of an animal which »had been sent alive by King Menelek of Shoa to the President of the French Republic — — — and the figure in the same »Proceedings» for 1899 p. 713 which should belong to *E. grevyi faurei* represents likewise »a fine female specimen of Grévy's Zebra presented to the President of the French Republic by the Emperor Menelek, and received — — — in September 1898». These three specimens have thus a similar origin, in spite of their different appearance, as all of them have come from King Menelik's dominions, pre-

sumably Shoa, and this makes the question about the two supposed races rather doubtful.

If there were two races of *E. grevyi* they must, of course, have a different geographical distribution and *E. g. faurei* should inhabit Southern Abessinian, Shoa and the region about Lake Rudolph southwards to Guaso Nyiri according to MATSCHE's opinion, while the typical *E. grevyi* should belong to Somaliland. Against this speak the facts already recorded that the late King MENELIK has sent as well specimens with broad black stripes on the neck (presumably *E. g. faurei*) as such with narrow stripes (the type of *E. grevyi* and another similar specimen) to Europe. Likewise speaks against the same supposition the fact that a skin sent by MENGES to HAGENBECK from Berbera, thus from Somaliland, has broad black stripes on the neck (as *E. g. faurei*). This can be stated on the figure published by SCLATER in Proc. Zool. Soc. London 1890 p. 413.

The confusion is still more increased when one reads in DRAKE BROCKMAN's book 'The Mammals of Somaliland'¹ about Grévy's Zebra. 'This is a small and dark Zebra. The black stripes being broad and very close together give it the appearance in the distance of a black pony.'

The Grévy's Zebras are, of course, the largest in the group. And those which I have had the opportunity of seeing, — and they can be counted in many hundreds, — never gave the impression of being black. On the contrary when the distance was so great that the stripes could not be discerned, the black and white blended together into a soft, pale, almost silvery grey. — On the other hand the common East-African Zebra (*E. granti*) sometimes and in certain shades of light looked quite black in a distance, but in other shades of light almost pure white. This was especially striking when a little flock was seen together, and some were standing so that they looked black and others white, but after a while they changed position and then also at the same time colour. The effect of the stripes of these two animals is thus considerably different when they are seen at some distance. They were always easily seen. In his above quoted book 'The Game Animals of Africa' LYDEKKER speaks about 'two races or subspecies of Grévy's Zebra'. The Somali race is mentioned under the name of '*E. grevyi berberensis*' which has been given by Pocock² 1902, but has been omitted in TROUSSERT's 'Catalogus Mammalium, Quinquennale Supplementum' 1899–1904. The type is said to be from Duhri, Ogadain and shot by Capt. SWAYNE. In this race the stripes are said to be dark brown and the interspaces washed with ochre-brown and very noticeably darker than the white of the belly (Pocock l. c. p. 308). Such a description appears to suit a young specimen, but an animal coloured like that would probably look, darker than a normally coloured Grévy's Zebra.

In a description of *Equus grevyi* Pocock writes³ — — 'this species is quite peculiar for the minute size of those bare patches of skin above the knee on

¹ London 1910.

² Ann. & Mag. Nat. Hist. 1902 Ser. 7, Vol. X, p. 308.

³ Ann. & Mag. Nat. Hist. 1897 Ser. 6, Vol. XX, p. 48.

the fore legs, which in England are spoken of as warts or chestnuts.» And a little further below, on the next page in the diagnose the author quoted expresses himself as follows: »Warts on fore legs very small». Although the »warts» are smaller than those of the Zebras of the *burchelli* group, such a general statement as this must, however, be taken cum grano salis as will be seen from the following measurements of these organs in my specimens. In one of them, an old stallion, they may be termed small as the diameter of the wart on one foreleg is only 8 mm. in diameter, but on the other it is 12 mm. In the next specimen the wart is 15×8 on one side and 18×14 on the other. In a third specimen it is 29×17 on one side and 32×18 on the other, and in a fourth about 34×18 on both sides. In these latter cases the warts hardly can be termed »minute». The great variability in size displayed in these specimens is quite remarkable because, in spite of the fact that these organs probably must be regarded as rudiments, their relative size, presence or absence has been regarded as a very important characteristic, a view which to some degree now must be modified.

The ergots are always very large in my specimens of Grévy's Zebra and have a diameter measuring from 30 to 40 mm.

As has been stated in the literature, the mane of the young foal of Grévy's Zebra is continued as a crest all along the back to the root of the tail. This disappears with age, and in the old individuals there is nothing left of this juvenile crest on the back. But in a young adult stallion remains of this crest are to be found. The hairs of the black stripe on the posterior back (but not anteriorly) attain a length of about 4 cm. and are thus strikingly longer than the very short hair of other parts.

The collection now described contains two fine stallions and a mare of Grévy's Zebra from the southern side of Guaso Nyiri near Lekundu river and a stallion from the thornbush country north of Guaso Nyiri at the water-place of the Rendiles called Njoro. All these specimens are alike in having the upper or dorsal portion of the tail-tuft more or less white and the under or ventral portion black. The black stripes on the sides of the neck are much broader than the white. These characteristics are thus in accordance with those given for *E. g. faurei*, and I have therefore mentioned this name but with hesitation, as I do not know, if it really belongs to a different race, or if it simply is synonymous with *E. grevyi*. The latter is the more probable as the type-specimens for both names have a similar origin, as far as is known, and the eventual difference in geographical distribution is as yet only hypothetical.

The measurements of a male (Conf. Pl. VIII Figs. 1, 2 & 3) and a female skull of Grévy's Zebra from this collection are given in the following table:

	South of Gunso Nyiri	
	♂ ad. | ♀ ad.	
	mm.	mm.
Basal length	547	547
Condylomeisive length	578	589
Greatest breadth of skull	210	217
» » » brain-case	102	111
Least interorbital breadth	143	132
Greatest length of nasals	291	293
» breadth of nasals behind	127	122
Breadth of nasals at anterior end of naso-premaxillary suture	57	48
Distance from orbit to tip of premaxillary	365	366
Length of upper molar series	186	183
Greatest breadth of premaxillaries in front	71	67
Length of palato mesially	282	271

The canines are strongly developed in the stallions, in the mare they are small but present as well in the upper as in the lower jaw. A small p^1 is present on the left side of the upper jaw of the old mare, and in a young stallion in which the last molar has not yet cut the gum the p^1 is present on both sides. It appears thus probable that these teeth are normally developed in all specimens but being functionless soon fall out.

A young stallion from Njoro with a condylomeisive length of 585 mm. has a skull which is even larger than that measured above, although this was a very fine middle-aged specimen, among the largest in the herd, and considerably bigger than an old stallion shot at the same time. In this young stallion from Njoro the permanent dentition is not yet fully developed. The condition of the dentition is as follows.

Upper jaw: i^1 in use and worn.

i^2 just cutting the gum.

di^3 in use.

c in a level with the jaw bone.

p^1 , p^2 , p^3 in use.

p^4 not yet fully in a level with the other teeth.

m^1 , m^2 in use.

m^3 just appearing.

Lower jaw: i_1 in use and worn

i_2 just visible on the left side, on the right di_2 still in use.

di_3 in use.

c the upper edge not yet at the upper surface of the jaw bone.

p_2 , p_3 in use.

dp_4 in use.

m_1 , m_2 in use.

m_3 just appearing.

A Horse with such a dentition would be between $3\frac{1}{2}$ and 4 years. It is possible that this specimen is not quite as old, but the relative order for the succession of the teeth appear to be the same in Grévy's Zebra as in a Horse. The same appears also to hold good for Böhm's Zebra as the dentition of such a skull in a somewhat earlier stage is as follows:

Upper jaw: i^1 , di^2 , di^3 , dc , p^2 , p^3 , dp^4 , $(p^4)^1$, m^1 , m^2 (m^3).

Lower jaw: i , di_2 (i_2), di_3 , dc , p_2 , p_3 , dp_4 , m_1 , m_2 , (m_3).

There is a rather striking difference of type between the skulls of the Grévy's Zebras (Pl. VIII Figs 1, 2 & 3) and those of the *burchelli* series from South Africa. The former have a much longer and comparatively more slender skull, while that of the latter is comparatively short and broad. The condyloincisive length of a skull of an old male *E. b. antiquorum* is for instance only about 530 mm., but its greatest breadth is fully 223 mm., thus more than the corresponding measurement of the longer skull of the Grévy's stallion (conf. table of measurements above). The greatest breadth of the skull is with other words only 36 % of the condyloincisive length in *E. grevyi* but 42 % in *E. b. antiquorum*. The least interorbital breadth of the latter is 156, that of the former 143 mm. thus resp. 29 and 24 % of the condyloincisive length of skull. The difference in length between the skulls of *E. grevyi* and *E. b. antiquorum* is chiefly due to the prolongation of the facial portion of the former, for the distance from the anterior brim of the orbit to the posterior surface of the occipital condyle is practically the same in both. On the other hand the distance from the anterior brim of the orbit to the tip of the premaxillaries is resp. 365 and 336 mm. In correspondence herewith the length of the palate mesially is resp. 372 and 352 mm. The different length of the molar series is also very striking. It measures in the *E. grevyi* stallion 186 mm. but in the *E. burchelli antiquorum* 151 mm. In spite of its length the facial portion of the skull of *E. grevyi* is comparatively more slender as well in breadth as in height. The width of the skull just in front of the orbit is in *E. grevyi* 185 mm., but in *E. b. antiquorum* 197 mm. The latter skull is, however, more suddenly narrowed so that it measures 132 mm. across the anterior margin of m^1 while the same measurement of *E. grevyi* is 138 mm., and the width at the base of i^3 is in *E. b. antiquorum* 63 and in *E. grevyi* 71 mm. The height of the skull expressed by measuring the distance between *sutura nasalis* and the alveolar margin of p^4 is 137 mm. in the former and only 131 mm. in *E. grevyi*.

The East African members of the *E. burchelli* series are considerably smaller than *E. b. antiquorum*. Their skulls are neither so broad, nor so heavy as those of their southern relatives. They are, however, comparatively broader than the skull of Grévy's Zebra. Thus the greatest breadth of *E. b. granti* is 39 % (perhaps sometimes 40), and the least postorbital width 27 % of the condyloincisive length of the skull.

¹ On one side p^4 just cutting the gum.

On the acacia steppe north of Meru boma we met with the first Grévy's Zebras between Itiolu and Lekundu rivers. They were rather common there in herds varying in number. On the march between the rivers mentioned I saw a mixed herd of the common or Grant's zebras and Grévy's zebras. The animals were grazing quite peacefully together, and it was evident that the two species did not take any more notice of each other than either species would have done, if the other had been Oryx-antelopes or any other kind of non related animals. It is thus evident that these two species are physiologically so distant that they have no feeling of relationship and rivalry, otherwise the stallions of the larger species hardly would have tolerated those of the smaller in the same intimately mixed herd.

Round our camp at Lekundu river "Kanganis", as these zebras are called by the natives, were rather numerous, and two fine stallions were shot there the first afternoon. When we were returning to camp with the skins and skeletons of these specimens after sunset I heard for the first time the peculiar cry of the Kangani, and I confess it was the most uncanny sound I ever heard in Africa (Lions, Leopards, Hyenas etc. not forgotten). It has nothing at all in common with the rather melodious bark of the zebras, but reminds more about the braying of an ass. It is very difficult to describe it starts like a grunt and is continued into a kind of long drawn out howl or scream variegated with grunts and shriller sounds. It is nothing equine about this cry, and one cannot imagine that this ghastly performance is produced by the beautiful Kangani.

The Kanganis were mostly seen on the quite open steppe, often in company with Oryx-antelopes. As a rule they were not very shy, and often it was not connected with much difficulty to come within range. Sometimes, however, they behaved quite differently and galopped away like mad as soon as they perceived any human being, even if they had not got the wind of him.¹

In the thornbush country north of Guaso Nyiri the Kanganis were not so numerous as on the steppe. Single specimens were also oftener seen there. They lived chiefly in such places where the thornbush was not very thick, and where some open places more or less covered with grass could be found.

The 18th of March when we again had crossed Guaso Nyiri to the southern side I saw on the steppe several Kangani mares accompanied by young foals which still were fawn-coloured. ROOSEVELT found young foals with the Kanganis in the latter part of Sept. which thus indicates irregular breeding-habits.

The hoofs of the Kangani are broad and horse-like. RIDGWAY² offers as an explanation of this the theory that it is not a mountain animal, but always keeps rather to the low and often swampy grounds. The localities where I had the opportunity of studying this animal were never swampy. It is possible, however, that in some places on the southern side of Guaso Nyiri the dust of the dry season will turn into mud in the rainy. In certain localities the steppe, especially near Itiolu

¹ ROOSEVELT found the Kangani even more wary and difficult to shoot than the oryx. (African Game Trails, p. 293.)

² Proc. Zool. Soc. London, 1909, p. 563.

river, consists of so soft ground that a walking man sinks down over his ankles, but I never saw any Kanganis in such places. On the southern side of Guaso Nyiri they were mostly seen in places where the soil was firm, sometimes with a layer of dry dust on top in which they now and then were seen rolling like horses. In many localities of wide extension the plains were thickly strewn with black, sharp-edged stones of volcanic origin, and even in such places the Kanganis were fully at home. The soil of the thornbush country on the northern side of the river mentioned consists of hard-packed gravel with a great amount of quartz pebbles. My experience is thus that the Kangani prefers hard ground.

The appearance of the hoofs of old specimens testifies that. The present author can fully confirm by own experience A. H. NEUMANN'S statement in »Great and Small Game of Africa» (p. 89): »In stony country the soles of an old Grevy's hoofs are sometimes worn almost quite flat, frog and all.» To this may be added that considerable pieces may be broken from the sides of the hoofs and, although this heals up again, the unevenness of the sides of the hoofs proves the hard usage they have been subjected to among the sharp stones.

Considering the altitude I have only three observations which can be referred to the habitat of the Kanganis. Our camp at Lekimundu river was according to the barometer 1150 m., Njoro about 750 m. above the sea level, and our camp below Chanler Falls at about the same altitude as the latter.

Artiodactyla.

Suidæ.

Potamochoerus chæropotamus kenix LÖNNBERG.

LÖNNBERG: Ann. & Mag. Nat. Hist., Ser. 8, Vol. IX, p. 66.

It is connected with great difficulties to obtain adult Bush-Pigs as they are nocturnal in their habits, and in day-time are hidden in the densest thickets that can be found, and where it is impossible to penetrate noiselessly as well as to see more than a few metres ahead. Fresh spoors were seen not far from Nairobi, in the forests on Kenia, and also at Meru boma, and a couple of times I even was near enough to hear when the pigs rushed away through the bushes but none was ever seen. In steppe and dry thornbush country they are not to be found, there the Wart-hogs take their place.

From Mr. KLEIN of Nairobi I obtained a couple of Bush Pigs which had been killed not far from the place mentioned. They are both fully adult specimens, and resemble each other in colour.

The whole head of an old sow (Pl. IX) including even the chin and lower jaw, is white, partly dirty white, with entirely black ears with rather long tufts, a black patch above either eye, and a black streak above the white whiskers. The head of

a somewhat younger sow is similar, the black patches at the eyes are less pronounced, but on the other hand, a blackish band, grizzled with white, running between the anterior corners of the eyes is more conspicuous than in the former. A well developed dorsal crest runs from between the ears backwards along the neck, over the withers, and to the middle of the back where it appears to cease abruptly. This crest consists of basally black bristles with long white tips which are dominant in the older, but are shorter in the younger so that the black of the crest in that specimen is seen everywhere among the white tips. On the sacral region again, in front of the root of the tail long black bristles with white tips form a bit of a crest. In this sacral crest there are very few white tips to the bristles in the old specimen. In the younger their number is greater, but they are not by far as numerous as above the withers. The sides of the back are rich rufous, much mixed with black in the old, duller rufous and with the black dominant in the younger sow. Sides of neck, chest, shoulders, hams, feet, and lower side shiny black in both specimens. Tuft of tail black.

The general colouration of these animals, and the length of the bristles indicate that they belong to the *P. charopotamus* group. But the nearly complete absence of black or dark on the forehead as well as on and around the snout, the white chin, and the abrupted dorsal crest appear to make this race quite distinct from the hitherto described forms.¹ In some respects it approaches to *P. intermedius* from Uganda. In *P. ch. nyasa*, and *johnstoni* the snout is more or less completely black above and below, and in other races there is a broad black ring around the snout, and the chin is black, even if the greater part of the face is pale.

These distinguishing characteristics are supported by others derived from the skull. The dimensions of the two skulls from Nairobi are recorded in the table of measurements below. It may be seen from this that the measurements of the boar(?) skull (conf. Pl. X) nearly agree with the corresponding measurements of the skull of an adult boar of Bush Pig from Kenia kept in British Museum Nat. Hist. where it bears the N:o 4, 11, 5, 17. The measurements of this latter skull have been recorded in my previous paper on the genus *Potamochoerus*.² In the boar skull of this collection the width of the parietal flat area is 8.3 % of the upper mesial length of the skull, and the same percentage for the specimen in British Museum Nat. Hist. is 8.5 %. The present female skull has this area somewhat broader, but such a discrepancy between the skulls of different sexes is found among other races as well. By this relative dimension of the parietal flat area the boar skulls of this race are very easily distinguished not only from the small and very narrow-headed Kilimanjaro race, *P. ch. daemonis*, and the likewise narrow-headed *P. ch. nyasa*, but at the same time also from the large- and broad-headed *P. ch. johnstoni*. The southernmost

¹ Conf. LÖNNBERG: Contributions to the knowledge of the genus *Potamochoerus*. Ark. f. Zool., Bd. 7, N:o 6, Uppsala & Stockholm 1910.

² Ark. f. Zool., Bd. 7, N:o 6, Stockholm 1910, p. 16 & 17. As I have not been able to read the proofs of this paper sufficiently because it was printed during my absence, there are unfortunately several misprints. Among other things it ought to be corrected that the type of *P. ch. daemonis*, of course, is the specimen of Brit. Mus. not that of Berlin.

	♂ Kenia Brit. Mus. 4, 11, 5, 17	♂(?) Nairobi B. E. A.	♀ Nairobi B. E. A.	♀ Gheleb, Eritrea
	mm.	mm.	mm.	mm.
Upper mesial length from occipital crest to tip of nasals	361	349	332	348
Width of parietal flat area	31	29	40	48
Greatest width at lambdoid crest	86	77	60	98
Distance from postorbital process to lambdoid crest	98	89	92	97
Greatest zygomatic width	170	177	162	161
Width at postorbital processes	102	106	109	101
Least interorbital width	69	79	78	72
Distance from orbit to front end of naso-premaxillary suture . .	203	193	179	191
Distance from hind surface of m ³ to tip of premaxillary	—	212	199	212
Length of m ³	33.5	33	33	32
Least width of skull between lambdoid crest and zygomatic arch	63	59	53	64
Least width of nasal surface of skull between the orbit and the apophyses above the canines	—	56	43	51
Width across upper ends of the canine apophyses	—	91	—	—
Width of nasal region on a level with anterior margin of canine alveoles	—	34	35	38

representatives of *P. charopotamus* have a much broader parietal area amounting to about 12 % of the upper length of the skull, while the somewhat more northern race *P. ch. maschona* has a narrower parietal area (amounting to about 6 %) than the Kenia Bush Pig. In some respects the skull of this latter strongly reminds about the West African Bush Pigs of the *P. porcus* group, especially by the great breadth of the posterior nasal region (Pl. X, fig. 3) between the orbits and the canine apophyses when compared with the anterior nasal portion in front of the apophyses mentioned. The nasal surface is flat especially in its posterior two thirds. The canine apophyses are very strongly developed in the boar(?) skull (Pl. X, fig. 1 & 3), their shortest anteroposterior diameter being 37 mm., and, although they hardly reach the level of the nasal surface they are very broadly ankylosed with the lateral exostoses of the snout so as to form a canal on the side of the upper jaw. This is the more striking as the animal to judge from the condition of the teeth (Pl. X, fig. 2) is not very old. Such a coossification between the canine apophyses and the lateral exostoses of the snout I have seen in, and also described from boar skulls of the *P. porcus* group, but I have not seen it in other members of the *P. charopotamus* group than this one so that I do not know if it is a common occurrence there, which appears, however, hardly probable.

The anterior portion of the zygomatic arch in the boar skull (Pl. X, figs 2 & 3) of the Kenia race forms a right angle towards the longitudinal axis of the skull, and at the same time the anterior bony wall formed by this arch stands nearly vertically. In the sow the latter is more sloping, but comparatively less than generally is the rule in the *P. charopotamus* group.

The race of Bush Pig described above has been named the Kenia race because it evidently inhabits the forests of the Kenia plateau. On the northern side of this plateau the dry Somali-Galla countries are situated, and on the southern side the open East African steppe. Both these surrounding countries do not offer suitable conditions of life for Bush Pigs, and the Kenia race appears thus to live in a certain isolation which may account for its differentiation. The geographically nearest race in the south east is *P. ch. damonis* (MAJOR) of Kilimanjaro which is easily recognized on its smallness and very narrow parietal area.¹ In the north the Abyssinian *P. hassama* (HEUGLIN) is a rather distant neighbour. This latter race is chiefly known from the first description,² but FORSYTH MAJOR has also published some notes and two figures of a skull. He points out as for this race especially typical characteristics the low canine apophysis, and "the elongation of the hinder part of the skull backwards from the postorbital processes of the frontals".³ These characteristics are also plainly shown in MAJOR's figures, and prove the distinctness in these respects of the Abyssinian race from the one from Kenia. The present author has not had any opportunity of examining any boar skull from Abyssinia, but an evidently female-looking skull has been obtained for this museum from Gheleb, Eritrea, through the kindness of Mr. K. G. RODÉN. The measurements of this skull have been recorded in the table above, side by side of those of the sow skull from Nairobi. From this may be seen that the posterior portion of the skull is broader with regard to several dimensions in the Abyssinian than in the Kenia specimen. The former is also somewhat longer with regard to its postorbital extension, although this is less striking than in MAJOR's figure of the boar skull. The nasals are more vaulted than in the Kenia specimen, and the anterior part of the zygomatic arch is much more gradually sloping towards the facial portion.

The colour of the Abyssinian race is very different from that of the Kenia race. Two skins of *P. hassama* male and female obtained by Mr. K. G. RODÉN at Gheleb have the snout and the upper part of the head behind the interocular region whitish. The whiskers and a streak below the eye are also white, the remaining part of the head blackish brown. Chin mixed with whitish. Ears, shoulders, hams, and feet blackish brown. Back and sides pale rufous somewhat mixed with blackish in the boar, still paler, partly buffish in the sow. The dorsal crest which does not extend over the posterior back, is whitish with hardly any, or few black bases to the bristles.

Two little pigs of *P. hassama* from the same locality are pale rufous somewhat mixed with black. A whitish crest is developed over the withers and anterior portion of the back. Preocular region of head above and below blackish brown; ears and feet of the same colour which extends more or less up the legs.

P. hassama is thus in all ages much paler than *P. ch. kenia* which latter with regard to its very dark colouration of the body more resembles *P. ch. damonis*.

¹ Conf. LÖNNBERG l. c. p. 27.

² Verh. d. K. Leop. Carol. Akad. d. Naturwiss., Bd. XXX, pt. II Nachtr., p. 7.

³ Proc. Soc., London 1897, p. 369.

Hylochoerus meinertzhageni THOMAS.

THOMAS: Proc. Zool. Soc., 1904, p. 193.

When the Expedition passed through the upper forest belt of northeastern Kenia where clumps of bamboo were mixed with the trees at an altitude of approximately 2,700 m. a skull of an old and very big boar of Forest-Pig was picked up by Mr. JANSSON, and close to it a few minutes later one of the boys found the lower jaw as well. It was no doubt a specimen which had been trapped by the Wandorobbos in one of their ingenious pitfalls, of which quite a number was seen during the march. The tusks and incisors were missing, probably broken out by the wild huntsmen, but otherwise the skull (Pl. XI) was complete with exception of the extreme tips of the nasals and the prenasal bone. In this region spoors and droppings of Forest-Pig were very numerous, the latter closely resembling those of domestic Hogs, although larger. In some places the Forest-Pigs had rooted up the ground,¹ and it appears that these animals are quite common in this belt of mixed bamboo and forest on the upper slopes of Kenia even on its northeastern side. I was also told by Mr. & Mrs. SANDBACK BAKER of Nairobi who kindly presented me a skull of an adult but not old sow of this species, that formerly these pigs had been found in the lower forest regions as well, but their regular haunts are no doubt the lower bamboo and upper forest region. The type of *Hylochoerus meinertzhageni* was obtained from Nandi, and from the same region MAURICE DE ROTHSCHILD and H. NEUVILLE have described several specimens of both sexes.² These authors describe their specimens, and figure the head of a sow (l. c. p. 144) with «deux taches blanches ou d'un blanc jaunâtre, l'une à la commissure des lèvres, l'autre au dessous de l'oreille, à l'articulation de la mâchoire» (l. c. p. 146). In an adult sow of Forest-Pig, obtained through ROWLAND WARD from Mau, these whitish spots are entirely absent. The bunches of bristles mentioned by the authors quoted as forming the spots are well developed, but are entirely black. In a similar way the specimen from Mau has not a single whitish bristle on its lower side, whereas ROTHSCHILD and NEUVILLE write about the specimens from Nandi «la gorge, la poitrine, le ventre et les parties internes des membres, en un mot toutes les parties inféro-internes de la peau sont parsemées de soies blanches» (l. c. p. 147). It is of course impossible to say whether these differences are constant or not, and in the male specimen figured by the authors quoted (l. c. Pl. I) these spots are not visible. Unfortunately I have not had the opportunity of seeing any skin of Forest-Pig from Kenia. C. W. WOODHOUSE says about the Forest-Pig of Mau: «there is usually a white tuft of hair in the sow and young on the horizontal tubercle of the face, and this remains in the boar as a few

¹ C. W. WOODHOUSE (conf. below when writing about the habits of the Forest-Pig of Mau says that it does not root. It is thus possible that the «rootings» seen by me were products of Bush-Pigs, although there were spoors and droppings of Forest-Pigs at the place.

² Bull. Soc. Philom. Paris, Sér. 9, T. VIII, 1906, p. 141.

³ The Journal of the East Afr. and Uganda Nat. Hist. Soc., Vol. II, No 3. p. 43. 1911.

scattered white hair.³ Compared with other statements above this proves the variability in the amount of white and its presence, or even absence.

	Old male from Kenia	♀ from Mau	♀ from Kenia
Greatest length of skull mesially to tip of nasals	465 ¹	408	367
Basiscranial length	407	359	325
Distance from posterior border of palate to tip of premaxillaries	310	262	236
Length of nasals	suture abolished	243	207
Greatest width of nasals	49	47	40
Distance from anterior brim of orbit to tip of premaxillaries	317	280	246
" " tip of postorbital process to lambdoid crest	115	98	87
Greatest zygomatic width	267	200	175
Least interorbital width	107	92	81
Width across postorbital processes	146	124	104
Width of parietal flat area	122	98	73
Least width of skull behind canines	77	67	67
Height from basion to top of occipital crest	138	122	113
Breadth across sockets of canines	152	120	100
Least width of palate between m ⁷	35	38	37
Basal diameter of canine	45 ²	33	21
Horizontal length of mp ⁴	—	12.5	12.5
" " " m ^{1 2}	—	16.5	18.5
" " " m ^{2 2}	—	25.3	26.5
" " " m ³ (visible parts)	43	38	33.5
Length of lower jaw	363	—	304
Breadth across symphysis at base of canines	114	101	94
Least breadth of lower jaw across diastema	85	77	73
Horizontal length of p ₁	16	13.5	11.5
" " " m ₁ ²	15.5	17	18
" " " m ₂ ²	24.5	25	28.5
" " " m ₃ (visible parts)	51	42	40

The dimensions of the three skulls of Forest-Pig which I have had for comparison are recorded in the accompanying table of measurements. The general proportions agree approximately with other specimens described before. The dimensions of the female skull from Mau resemble rather closely those of THOMAS' type which was a young adult boar.

The zygomatic arch of the big boar skull is very strongly thickened and has a very rugged surface which corresponds to the enormous wart with which these animals are provided, and which is homologous with the wart below the eye in the Wart-hog.

In one respect viz. with regard to the shape of the nasals my two specimens from Kenia are more alike inter se than either of them resembles the specimen from

¹ Approximately, tips of nasals broken!

² The length of the anterior molars is diminished with the increasing age of the animal.

Mau, although the former belong to different sexes and are of different age. This likeness consists therein that the nasals are shorter so that their posterior end is considerably in front of the anterior suture between the *lacrimale* and *maxillare*. At the same time the posterior half of the nasals is flatter, especially opposite *foramen infraorbitale* than in the specimen from Mau. In the latter the nasals extend further backwards so that their posterior ends are on a level with the anterior suture between *lacrymale* and *maxillare*. The posterior half of the nasals are rather strongly vaulted in the specimen from Mau so that the distance from the alveolar brim opposite *foramen infraorbitale* to the median nasal suture is 85 mm., whereas the same measurement in the very much bigger boar-skull from Kenia is only 82 mm., and in the female skull from Kenia hardly 73 mm. Whether this is a racial characteristic, or individual variation cannot be decided on the present material. The agreement of the Kenia specimens, although they are of different sex, is, however, worthy of being pointed out.

Considering the dentition it is of interest to note that in the female skull from Mau dp^1 on the right side has fallen out and given place to a comparatively small p^1 , while on the other side dp^1 is still in use. This is in accordance with observations made by ROTHSCHILD and NEUVILLE (l. c. p. 153). In the female skull from Kenia dp^1 on both sides are still retained but the tooth is on the verge of being pushed out with the roots partly resorbed, especially posteriorly on the outer side.

In the Mau specimen the dentition is, or has been more complete even than in the somewhat younger specimen from Kenia. In the former there are open alveoles in front of p^2 for p^2 which has, however, fallen out probably after the death of the animal. In the lower jaw there are in front of p_4 two small open alveoles which probably have belonged to dp_5 . On the right side there is in addition to this a rudimentary but not very small tooth sunk in the jaw. Its length is about 8 mm., and its breadth 6 mm. As it is situated much nearer (distance 24 mm.) the canine than the alveoles of the presumed dp_5 (distance 40 mm.), it must be considered to be dp_1 .

In the female Kenia-specimen there is only a very small alveole somewhat in front of p^3 , and nothing in front of p_4 in the lower jaw.

The Mau-specimen is well provided with incisors as well. About 10 mm. behind i^1 a tooth is situated which appears too strongly developed to be a milk-tooth and which as I presume ought to be regarded as i^2 . Its cutting edge has a length of fully 7 mm., and its basal parts are stout as well.

In the lower jaw on the right side there is a quite strongly developed tooth behind i_2 . Its crown has a length of 11,5 mm., and a thickness of nearly 5 mm. It differs very considerably in its shape from the slender di_3 of a *Hylocharus* as figured by ROTHSCHILD and NEUVILLE (l. c. Pl. 7), and I must consider this tooth to be i_1 . MATSCHIE has also found i_3 in a specimen of his *Hylocharus ituriensis*.¹ On

¹ Ann. du Mus. du Congo. Zool., Ser. V, Etudes sur la Faune Mamm. du Congo, T. 1, Fasc. 1.

the other side of the jaw this tooth appears to have been broken and resorbed as there is a mark in the jaw bone.

The female specimen from Kenia has also had on one side of the lower jaw a well developed i_3 to judge from the size of the alveole, but on the other side there is only a trace of an alveole.

These observations prove that there is a considerable variation with regard to the development of the dentition of *Hylochoerus*, but this variation is probably individual.

The following measurements of different bones of the skeleton from Mau agree as a rule, more closely with the corresponding measurements recorded by ROTHSCHILD and NEUVILLE for their greatest boar from Nandi than with those of the biggest sow (conf. l. c. p. 160--163). This appears to indicate that the Forest-Pigs attain a greater size on the Mau mountains than in the Nandi forest. The same is probably also the case with the Forest-Pigs of Kenia as the old boar skull picked up there by this expedition is larger than those from Nandi.

Length of scapula	233 mm.
Breadth at upper end of scapula	151 "
Least breadth of scapula	40 "
Greatest length of humerus	271 "
Length from caput to lower condyles	233 "
Greatest breadth at lower end of humerus	60 "
" " upper " " " " " " " "	95 "
Greatest length of radius	183 "
" breadth at upper end of radius	45 "
" " lower " " " " " " " "	51 "
Least " of diaphyso " " " " " " "	26 "
Greatest length of ulna	255 "
" " olecranon from upper edge of sigmoid cavity	88 "
" " femur	276 "
Distance from caput to inner lower condyle	276 "
" between lateral surfaces of lower condyles	70 "
Greatest anteroposterior diameter at lower end of femur	79 "
Diameter of caput femoris	36 "
Greatest length of tibia	228 "
" transverse upper diameter of tibia	68 "
" " lower " " " " " " " "	39 "
" distance from ala ilii to tuber ischii	297 "
" width of pelvis across ala ilii	300 "
" " each ala ilii	144 "
" " across acrobular region	173 "
" length of 3d metacarpal	87 "
" " 4th " " " " " " " "	85 "
" " 3d metatarsal	82 "
" " 4th " " " " " " " "	87 "
" " calcaneus	107 "
" anteroposterior diameter of calcaneus	39 "

Greatest transverse diameter of calcaneus	30 mm.
" length of astragalus	53 "
" breadth of "	36 "
" thickness of "	30 "

M. DE ROTHSCHILD has criticised (l. c. 142) reports about the Forest Pig in which this animal has been compared in size with a zebra. The latter animal stands of course higher on the legs but in bulk and weight of body an old boar of Forest-Pig may not be very much smaller.

Phacochærus delamerei LÖNNBERG.

LÖNNBERG: Proc. Zool. Soc. London 1908, p. 940.

When the present author named this new species of Wart-hog and based the description on two skulls in British Museum Nat. Hist. it was not known with full certainty where these skulls had been collected, but it was presumed that they were from Somaliland. Last spring (1911) when I had the pleasure of meeting the donor of the skulls mentioned, Lord DELAMERE in Nairobi, he told me that they probably were from the country north of Guaso Nyiri which by the present expedition has been proved to be inhabited by a fauna agreeing with that of the Somaliland to great extent.

Wart-hogs were by no means numerous in those parts of the Guaso Nyiri district which I visited. I saw only once a sow with two half-grown pigs in the thornbush-country near the water-place Njoro. I shot this sow through the chest, but she escaped in the bushes, although severely wounded and very much bleeding.

Some time later Mr. Å. SJÖGREN shot an old sow of the same kind on the northern side of Guaso Nyiri and allowed me to keep the head for the collection of the Expedition. This specimen measured about 112 cm. from snout to vent and about 65 cm. in height at withers. The skull of this female (Pl. XII) exhibits the characteristics which the present author has pointed out as typical for *Phacochærus delamerei* (l. c. p. 938). There are no incisors in the upper jaw, and the premaxillaries are so very thin that they could not possibly hold any alveoles for incisors just as in the type specimens. In the lower jaw four rudimentary incisors are to be seen. The nasals are rather flat, not forming any ridge behind. The shortness of the postorbital portion of the skull is quite striking (Pl. XII). The length of this portion is only 11.3% of the upper length of the skull (resp. 10.5% and 10.9% in the type specimens in British Museum Nat. Hist. The width of the parietal flat area is a little greater than the length of the postorbital portion of the skull. It is 12.9% of the upper length of the skull thus a little more than in the types viz. 11.9%, and 11.5%. The interorbital width is 36.6% of the length of head. This is a little more than in the types viz. resp. 33.0%, and 34.7% but this difference is not great enough to speak against the identity with *Ph. delamerei* especially as other important characteristics fully agree. It is thus stated that this species inhabits the thornbush country north of Guaso Nyiri and may from there extend towards Somaliland.

The following measurements of the skull of this specimen are recorded for comparison with other species.

Length of skull mesially from occipital crest to tip of premaxillaries	325 mm.
Basiscranial length	263
Width of parietal flat area	42
Least interorbital width	119
Greatest zygomatic width	197
Length of the postorbital portion of the skull	36

From these measurements may be seen, as well as from the percentages quoted above, how widely *Ph. delamerei* differs both from the broad-headed *Ph. massaicus*, and the long-headed *Ph. aliani*.

When speaking about this last species I take the opportunity of discussing a question about the identity of *Ph. aliani* CRETZSCHMAR, and *Ph. haroia* EHRENBURG, which I have not been able to settle before, but for the solving of which I have now received some material. The Swedish Missionary Rev. Mr. K. RODÉN has kindly procured a fine skull of a Wart-hog boar from Gheleb in Eritrea. This place is situated only about 75 kilometres northwest from Arkiko which is the type locality of "*Ph. haroia*". It appears thus most probable that the same kind of Wart-hog shall be found at these two not very distant localities.

The male skull from Gheleb measures mesially from occipital crest to tip of nasals 391 mm. and has thus very nearly the same length (viz. 388 mm.) as an Abyssinian skull of *Ph. aliani* in Brit. Mus. Nat. Hist. The length of the postorbital portion of both skulls is the same viz. 60 mm. The width of the parietal flat area is a little greater in the skull from Gheleb viz. 32 mm., but it can nevertheless be termed narrow as it is only about 8,2 % of the length of the skull. The interorbital width measures 123 mm. that is about 31,4 % of the upper length of the skull, while the same percentage for the Abyssinian skull is nearly the same viz. 31,7 %. There can thus be no doubt that the Wart-hog from Gheleb is identical with the Abyssinian *Ph. aliani*, and accordingly it may be concluded that *Ph. haroia* is fully synonymous with *Ph. aliani*.

For future comparison a few measurements of a female skull of *Ph. aliani* from Gheleb may be added:

Length of skull mesially from occipital crest to tip of premaxillaries	335 mm.
Width of parietal flat area	33
Least interorbital width	163
Length of postorbital portion of skull	55

The parietal flat area is thus in the female a little broader than in the male.

Phacochærus africanus subsp.

Wart-hogs are or have been not uncommon on the plains around Nairobi. As I, however, had very little opportunity of shooting there, I did not obtain any ma-

terial. It could be expected that the Wart-hogs of these plains should belong to *Phaerocherus massaicus* LÖNNBERG this is, however, not the case. I had the opportunity of measuring the skull of an adult boar which had been sent to Mr. KLEIN for mounting. The upper mesial length of this skull from the tip of the nasals to the occipital ridge was about 427 mm.; the interorbital breadth 127 mm.; the width of the parietal flat area 43 mm.; and the distance from the occipital crest to a transversal line through the middle of the orbits 75 mm. These measurements prove that the difference from *Ph. massaicus* is very considerable. The postorbital region is rather long in both, viz. 14% of the length of the head in *Ph. massaicus*,¹ and 15% in the Nairobi skull, but the posterior region of the skull is much narrower in the latter. This is proved by the fact that the interorbital breadth is only 29% of the length of the skull, against 38.8% in *Ph. massaicus*, and the width of the parietal flat area is only 10% against 14.5% in *Ph. massaicus*. In this respect the Nairobi Warthog is intermediate between *Ph. massaicus* and *Ph. africanus aliani* in which latter the interorbital breadth is 31.7% and the width of the parietal flat area is 6.3%. This intermediate stage of the Nairobi Warthog appear to indicate its racial distinctness, but for lack of material I cannot express any definite opinion.

During my stay near Escarpment station in the beginning of January 1911 I bought a quite young pig of Wart-hog from the Kedong valley which a Kikuyu brought to my camp. *

Hippopotamidae.

Hippopotamus amphibius LIN.

Below Chanler Falls the river Guaso Nyiri was inhabited² by Hippopotamuses. Spoors were seen now and then on the sand-banks in the river and also on dry land, but the animals were not very numerous in that portion of the river along which I passed. This appears to be quite natural because the river is during the dry season in most places so shallow that the water would not cover a fullgrown Hippopotamus, and in addition to this, there is hardly any vegetation on which such animals could feed. At two occasions, however, I had a very good opportunity of watching such animals. The first time this happened, a Kiboko³ had passed close to the camp just before sunrise. I got information about this and hurried after it. Some little distance above the camp it entered the river again, and when the sun had risen it was found to have taken its refuge to a place where the river was running rather swiftly and with strong current through a narrow cañon, where the water accordingly was deep. I sat watching it on a rock opposite, and it lifted its snout regularly to breathe. When I saw that it was an immature specimen I did not want to shoot it as it would have been "wanton destruction", and too much of that kind is to be

¹ Conf. LÖNNBERG: Proc. Zool. Soc. London 1908 p. 937.

² Once or twice spoors were also seen above these falls.

seen in Africa now-a-days. The other time I found a Hippopotamus in a small but deep pool at the side of the river. This specimen was evidently a fullgrown cow, but as it had a small calf I did not care to shoot that time either.

Mr. SJÖGREN had shot some Hippopotamuses at that same place, and one of them was a gravid¹ but only semiadult female with the last molar not yet developed. This was the largest Hippo which I saw at Guaso Nyiri, and it was certainly small. It is therefore possible that a dwarfed race lives in this river. If this is the case, it ought to be protected because its distribution cannot be very great even if there are better conditions of life for a Hippopotamus in the Lorian Swamp than in Guaso Nyiri itself.

Giraffida.

Giraffa camelopardalis reticulata DE WINTON.

DE WINTON: Ann. & Mag. Nat. Hist. 1899 Ser. 7, Vol. IV, p. 212.

On the acacia steppe south of Guaso Nyiri Giraffes were seen now and then sometimes single, sometimes in small flocks. The 11th of February I saw for instance near the crossing of the Marsabit road 8 giraffes all cows and young animals. As the acacias were leaf-less they had not much to eat and appeared therefore to be restless, travelling all the time from a group of trees to another. They were also very shy here. When we had crossed to the northern side of Guaso Nyiri and turned to the east a couple of days march the Giraffes became more numerous. The 15th of Febr. I saw first seven, four of which were adult with the typical *reticulata*-pattern and colouring. The younger animals were less dark, more reddish-looking because the spots were more reddish brown, and the light interspaces broader and more yellowish than in the adult or old animals. Later on the same day I had the pleasure of counting 14 of these splendid animals at one time.

Around the water-place of the Rendiles called Njoro Giraffes were not uncommon. From the top of a rock I counted for instance one day at the same time 6 in one direction, probably cows and immature animals, in another 2 cows and a calf, and in a third 2 bulls and a cow. The animals were, however, extremely wary at this place, and I got no opportunity of securing a specimen. When we had come further east and were camping some distance below Chanler Falls, the Giraffes were found to be still more common and less shy. I shot a very fine bull the first morning without any difficulty, and afterwards hardly a single day passed without that I saw Giraffes, often at rather close quarters. One day I shot a Gerenuk not 100 m. from a young bull Giraffe which stood resting under a cactus-euphorbia, but he did not move before we carried the body of the Gerenuk to the tree because we wanted the shade for the skinning work. At another opportunity I came quite close to a Giraffe which just wanted to drink out of the river in the afternoon. One of

¹ Some parts of this foetus were saved.

the Giraffes which I saw more than once had no tail tuft, and the tail was mutilated probably by some carnivorous animal. That a Giraffe was killed by Lions near our camp below Chanler Falls has been mentioned above (p. 75). Otherwise I suppose that the fullgrown Giraffes have hardly any other enemies than man. The hide-hunting has been successfully stopped, I believe, by the regulation that 5 £ must be paid for the license permitting one Giraffe to be killed. Fortunately for the species its head and horns are not very suitable as trophies, and therefore I hope that these beautiful and interesting animals shall be able to live long in the arid thorn-bush country, north of Guaso Nyiri where certainly no settlers can expect to raise any crops on the gravel. And as the Giraffes browse in the tops of the acacias they cannot be said to compete about the food with the camels, cattle and sheep of the nomades. It does not therefore appear to be any reasonable cause for that they should be exterminated, and for the present the stock is good, I am glad to say.

The Giraffes feed chiefly in the morning and in the afternoon. During the heat of the day they are often seen standing motionless under some acacia or euphorbia asleep.¹ It is easy to perceive even in a distance whether a Giraffe standing under a tree really is asleep, or not. If it is, the neck is not held so straight up as in a walking or browsing animal but it slopes forward very much in an analogous manner (although of course not so low!) as a sleeping or tired horse lets its head hang. It appears as if the long neck almost should upset the balance of the animal when its upper contour line is a straight continuation of that of the sloping back, but this is not so. Such an attitude evidently relieves and rests the musculature of the neck. The adult bulls which have a much heavier skull than the cows and the young animals have, in correspondence to this, a much thicker neck than the latter. This is so conspicuous that it can be seen already at a considerable distance. The adult animals are, as already mentioned, darker than the young. That is, the dark areas are more strongly pigmented but the light net-work is white. A result of this is that the old animals usually look darker, but in certain shades of light they may shine rather whitish, just as Grant's zebras sometimes look whitish sometimes blackish. The young animals have red spots on a yellow ground colour which forms comparatively broader interspaces than the white net-work of the adult. The effect of this is that the young animals look reddish, and the same appears to be the case with some apparently fullgrown cows as well. But there is a certain amount of variation to be seen. The 28th of Febr. 1911 I saw two Giraffe cows near Thera which had comparatively small but very dark spots with broad whitish interspaces between. The bull in their company was more of the *reticulata*-type. There is thus no doubt that transitional stages between the "netted" and the "blotched" Giraffes occur.

The Giraffes are very easily seen, even when they stand motionless, at a long distance, if not covered by trees or bushes, and I must confess that I never could detect anything protective in their colouration. The young and the adult are also

¹ That is their habits during normal conditions but as mentioned above, if food is scanty during the dry season the Giraffes are more restless and may be seen travelling all day.

so different in colour that if either was protectively coloured the other could hardly be so.

The pattern of the Giraffe can thus hardly be said to be protective and a result of natural selection for that purpose. The present writer must agree with ROOSEVELT when he says — — — save under wholly exceptional circumstances no brute or human foe of the giraffe could possibly fail to see the huge creature if fairly close by; and at a distance the pattern of the coloration would be lost. The giraffe owes nothing to concealment; its coloration has not the slightest concealing effect so far as its foes are concerned.

But if the pattern of colouration of the Giraffe cannot be explained as protective some other explanation must be tried. A comparative study of the different races of Giraffe and their young ones may perhaps give a hint for the understanding of the origin of the pattern. In the young Giraffes there is less difference in colour between the spots or blotches and the ground colour, and the interspaces between the spots are comparatively broader than in the adult. In some races of Giraffe (e. g. *G. c. tippelskirchi*) the spots of both sexes are irregular with jagged contour, more or less star-like in shape. In other races (e. g. *G. c. rothschildi*) it is only the females which have irregular, jagged and star-like blotches which are reddish chestnut in colour upon a light orange-fawn ground (LYDEKKER), while the males have large and very dark-coloured spots, showing a tendency to split up into stars, as indicated by lighter tripartite radiating lines in the larger ones and the light interspaces yellowish fawn forming narrow network-lines on the body. — — —¹ Still another type is the one displayed by *G. c. reticulata* in which the ground colour of the fully adult animals is reduced to a white net-work of comparatively narrow lines between large dark areas.

It is a generally accepted rule that the colour of the young, when it is different from that of the adult, and does not show any distinct secondary adaptation, represents a recapitulation of a phylogenetically earlier stage of development. It is also a general rule among mammals, and certainly not least among ruminants that the old males represent the latest and most specialised type. Considering this and the facts about the colouration of Giraffes as stated above, it appears more than probable that the pattern of these animals has been gradually developed in such a way as the ontogeny of several races indicates. The first stage has thus had comparatively indistinct or ill-defined blotches which have not been very much darker than the reddish or yellowish red ground colour. In the next stage the blotches have deepened in colour, but their outlines are still indistinct, or at least irregular and jagged. The darkening of the spots has been very well described by THOMAS for the race which some few years later was named *G. c. rothschildi* by LYDEKKER. THOMAS writes:² 'The blotches in young specimens are reddish fawn, darkening in the centre to deep blackish brown, and this darkening spreads outwards in old specimens, until the blotches are wholly blackish.' A few lines further below THOMAS also points

¹ LYDEKKER: Proc. Zool. Soc. London 1904 p. 210.

² Proc. Zool. Soc. London 1911, p. 475.

out that the darkening of the centres of the blotches as well as their total blackening has been repeatedly observed in the Southern Giraffe. Some races like *G. c. tippelskirchi* of German East Africa, and *G. c. wardi* of Northern Transvaal remain in the stage with star-like spots, and it is of interest to note that such a stage is found as well among the Giraffes with a well developed frontal horn (*tippelskirchi*), as among those with the frontal horn rudimentary (*G. c. wardi*). In a later stage of development the blotches become more compact and larger. This is effected by deposition of more pigment in the periphery of the spots especially in the interspaces between the irregular processes of the star-like blotches. Finally an increase in size takes place by the confluence and combination of several adjoining blotches into larger dark areas. That these latter really have originated in such a way as described is proved by the fact that remnants of the formerly existing light interspaces between the primary constituents often can be seen in the shape of radiating light streaks here and there. It is such remnants of former light interspaces between primary spots which are described by LYDEKKER¹ as lighter tripartite radiating lines in the larger spots of *G. c. rothschildi*. It is thus not a tendency to split up into stars as the author quoted says, which makes itself known by these radiating lines, but exactly the opposite, a confluence of spots into larger areas. Even in *G. c. reticulata*, which represents the last stage in this series of development of pattern, similar light streaks radially cutting into a large dark area may be seen (conf. Pl. VII, fig. 3), although comparatively rarely. A good proof for the confluence of primary spots into larger dark areas is given by the fact that very often such areas show not one but several such dark centres which are commonly seen in the primary spots or blotches. Very good illustrations to this are to be found in LYDEKKER's paper in Proc. Zool. Soc. London 1904 Vol. I, for instance Pl. XII *G. c. rothschildi* ♂, Pl. XV fig. 1 the neck of *G. c. coltoni*, and Pl. XVI *G. c. capensis* ♂.

There appears to be no doubt whatever that the development of the pattern of the Giraffes has taken place in such a way as I have tried to set forth above. The cause of this development is, however, more difficult to indicate. It has already been stated that it cannot have been natural selection for protective purposes.

It is a very common thing among Ruminants that the adult are darker than the young, and especially the bulls have a tendency to blacken with age. It is also a fact that some of the most specialised types among the larger ruminants in the adult stage of both sexes are quite strongly pigmented. It is thus only in accordance with a general rule among Ruminants that the adult bull Giraffes are darker than the young and immature. It appears also to be in agreement with the conditions prevailing in other groups that this general darkening which from the beginning only was found in the old males by and by extends to both sexes. But if the starting point is something like a young *G. c. tippelskirchi* with comparatively pale and jagged star-like spots, and an increase in the pigmentation takes place with the darkening spreading from the centre of the spots it is quite natural that a pattern similar to that of *G. c. reticulata* will be a final result.

¹ L. c. 1904, p. 210.

I have now tried to show that the development of the pattern of the Giraffes as it has reached its present maximum in the *reticulata*-type is analogous with other phenomena among the Ruminants, if it is only assumed that the original pattern was spotted.

Nothing is known, of course, about the colour or pattern of the ancestors of the Giraffes, but it does not appear at all improbable that they might have had the pigment more or less concentrated round certain centres on an otherwise somewhat paler ground colour. It is not needed to assume that these ancestral types should have had a sharply defined spotted pattern. It is quite sufficient if they from the beginning had had such rosettes of accumulated pigment as for instance often are seen in red domestic cattle in Sweden as well of native as of Ayreshire breeds. This is mentioned only as an analogy, but also because such a pattern appears to the present writer as a probable starting point in the development from a comparatively more or less uniform to a spotted coat. A concentration of the pigment at and around these centres would probably result in a blotched pattern.

It is, of course, also possible that the first blotched pattern was developed as the result of broken up longitudinal stripes which may have been present in the early ancestors of the Giraffes, and of which the stripes on the hind quarters and legs of the Okapi may be the only remnants saved up to the present date. The occurrence of longitudinal stripes in the first coat of the young Ungulata belonging to several widely distant groups (f. i. Tapirs, Pigs, Deer etc.) appears to indicate that this was the primitive pattern of the ancestral Ungulata.

The specimen of *G. c. reticulata* which I shot on the northern side of Guaso Nyiri below Chanler Falls was a splendid old bull with worn teeth and probably at the height of its development. As can be seen from the photos of the skull (Pl. XIII fig. 1) the azygous frontal horn is strongly developed. It rises from a broad conical base and continues in a thick cylindrical portion which is rounded and truncate at the end like the main pair of horns. The basal portion of the azygous horn is studded with small exostoses in front and on both sides but those of the right side are larger (Pl. XIII, fig. 2). In front of this horn on the posterior portion of the nasals is a somewhat bigger boss, which lies entirely on the right side of the mesial line (Pl. XIII fig. 2). This skull is, however, by far not so dextral in its development as that of a bull of *G. c. tippelskirchi* MATSCHKE from Kilimanjaro described by the present author at another opportunity.¹ The right of the main pair of horns is basally a little thicker than the left, and the thickened basal portion extends forwards nearer to the orbit than on the left side (Pl. XIII fig. 2). The roof of the right orbit is provided with a small boss but is otherwise hardly thicker than that of the left. The posterior or occipital pair of horns are not so typically developed as in old males of the Baringo Giraffe, but there is an osseous thickening on either side, and that of the right is the stouter, and it extends about 5 mm. further laterally than the left. It is thus evident that this race is 'right-headed'.

¹ »Mammals» (p. 35—37) in SJÖGREN'S Wiss. Ergeb. Kilimandjaro Meru Exped.

or that it prefers to use the right side of the head when butting, but in less degree than for instance *G. c. tippelskirchi*,¹ and *G. c. cottoni*.² A skull of an old bull Giraffe from the Sotik, which I saw in Nairobi and which, I suppose, represented *G. c. tippelskirchi*, had the occipital exostoses and those above the orbit much bigger on the right than on the left side; the right main horn was thicker than the left; and the nasal exostoses were chiefly situated on the right side of the median line. These facts indicates that »right-headedness» is a common feature among Giraffes.

The dimensions of the skull of *G. c. reticulata* are seen in the following table of measurements. If this skull is compared with a skull of *G. c. tippelskirchi* from Kilimanjaro it will be seen that the main pair of horns and the azygous frontal horn are much better developed in *G. c. reticulata*.

	<i>G. c. reticulata</i> ♂ from Guaso Nyiri	<i>G. c. tippelskirchi</i> from Kilimanjaro
	mm.	mm.
Condylbasal length	597	633
Basal length	570	607
Greatest breadth	267	307
Distance from gnathion to anterior end of nasopremaxillary suture . . .	151	168
» » » to orbit	379	397
» » orbit to hind surface of occipital condyle	223	234
» » gnathion to anterior premolar	245	258
Length of upper molar series	149	153
Breadth of skull across hind end of nasopremaxillary suture	88	98
Height of skull at the same place	89	109
Breadth across bases of main pair of horns	227	212

But on the other hand the nasal exostoses and the supraorbital bosses are much more strongly developed in *G. c. tippelskirchi* which results in giving it a greater breadth of the skull across the orbit. And the nasal portion of the skull is as well higher as broader than in *reticulata* as the measurements prove.

The sperms of the Giraffe have been described for the first time from prepa- rates of this specimen of *G. c. reticulata* by G. RETZIUS.³

This Giraffe was infested by a great number of ticks around the anal opening and around the base of the scrotal sack where the skin is thin. They proved to belong to the species *Hyalomma aegyptium* (L.)⁴

¹ Conf. my above quoted paper on this subject.

² According to LYDEKKER.

³ GUSTAF RETZIUS: Biol. Untersuchungen N. F. Bd. XVI. Stockholm 1911.

⁴ Conf. L. G. NEUMANN: Ark. f. Zoologi. Stockholm. Bd. 7 n:o 24.

Bovidae.

Bubalis cokei (GÜNTHER).

SCLATER & THOMAS: Book of Antelopes, Vol. I, p. 27.

The »Kongoni» as Coke's Hartebeest usually is called in Brit. East Africa, is the commonest Antelope on the great plains along the Uganda railroad in the southern game reserve, and around Nairobi it is still common, although its numbers are diminished where the country has been settled. At Juja farm Kongonis were abundant on the open plains. It does not appear to extend its distribution north of Tana river, at least not in the interior of the country. It was not seen on the acacia steppe south of Guaso Nyiri, although its companion on the Athi plains, Grant's Zebra, was common there.

In the »Book of Antelopes» it is quoted from GEDGE concerning this species: »The cows calve during the latter part of November and December» — — —. It is very possible that some of the cows calve at that time, and some calves which I saw in the beginning of April appeared to be a few months old, while calves seen from the train in the southern game reserve²⁴ 12 1910 looked to be more than a month old. But ROOSEVELT's observation¹ on the Athi plains where he says that he found »new-born wildebeest and hartebeest calves, and others several months old» in the month of May is more in accordance with my own experience. I shot for scientific purpose two Kongoni cows the 11th of April and both those contained foetuses which were covered with hair and nearly full-grown. The majority of the cows appeared at that time to be in the last stages of gravidity. But as already mentioned there were also calves which probably had been borne some months earlier their number was, however, less than that of the gravid cows. I saw only once a Kongoni cow with twins.

The dimensions of a male and female skull from Nairobi are as follows:

	♂ ad.	♀ old.
	mm.	mm.
Greatest length of skull	420	438
Basiscranial length	340	378
Greatest breadth	136	141
Least interorbital breadth	86	92
Greatest length of nasals	191	186
Width of nasals in front	30	34
Length of upper molar series	89	86

As can be seen the measurements of this cow are larger than those of the bull which may depend upon the fact that the cow was unusually big, and the bull only

¹ »African Game Trails», p. 292.

an average specimen. In the *Book of Antelopes* the basal length of the skull of this species is stated to be 14 inches viz. 355 mm. and the greatest breadth to 5.2 viz. 131 mm.

The behaviour of the Kongonis, how they have their sentinels standing on termite hills and so on, has been repeatedly described. They are always wary and sometimes very shy, but show at the same time a certain amount of curiosity. It has been much spoken about the tenacity of life of this Hartebeest. If hit in the right place I think, however, that they succumb as quickly for the bullet from a modern rifle as any other antelope of that size.

The Kongonis look sometimes more yellowish sometimes more reddish, but it may depend upon the light.

The specimens which I shot on the plains near Nairobi were infested with ticks of the species *Rhipicephalus pulchellus*.

***Connochætus albojubatus* THOMAS.**

SLATER & THOMAS: *Book of Antelopes*, Vol. 1, p. 105.

Mr. W. N. Mc MILLAN of Juja farm kindly granted a fine bull Wildebeest to be shot for the collections ¹⁹ 1911. There was quite a number of this species on the plains belonging to his farm, but on our way further north we did not see any more so that I suppose that Tana river is the northern boundary line of this species east of Kenia.

The habits and behaviour of this animal has been repeatedly described, and I have nothing of value to add. It is strange to see how big and entirely black this Gnu looks at some distance. When they run with lowered heads they remind in a very striking manner of Bisons in spite of the in reality great difference in size.

The specimen shot was greatly infested with ticks chiefly *Rhipicephalus pulchellus*.

The dimensions of this skull agrees closely with the corresponding ones of the typical skull viz.

Basiscranial length	398 mm.
Greatest breadth of skull	182 "
Distance from orbit to tip of premaxillary	295 "

***Cephalophus harveyi keniae* LÖNNBERG.**

LÖNNBERG: *Ann. & Mag. Nat. Hist.* 1912, Ser. 8, Vol. IX, p. 65.

Harvey's Duiker has been recorded from Dar es Salaam, Tanga, the Kilimanjaro district, and Southern Somaliland. It could then be expected that the red Forest-Duiker of the Kenia district would prove to belong to this species. Since I had succeeded in obtaining a specimen myself I found that there appears to be some

differences which are quite easily seen between this animal and *Cephalophus harveyi* according to the descriptions found in the literature. My specimen may be described as follows:

Fur close, fine and glossy with the hairs of the back measuring 20—27 mm.¹ General colour rich chestnut red, fading below to rufous. The black blaze on the forehead extends from the muffle to the coronal tuft; on the nose it is about 17 mm., but widens to twice that in the interocular region. The greater and central portion of the tuft is mahagony, but the lateral parts are rufous. Eye-brows and sides of the face rufous. The black central stripe is continued on the nape behind the mahagony-coloured tuft and is then dissolved in the mixed black and chestnut red of the upper neck which extends to above the shoulders. Chin dusky anteriorly, but behind this part it is whitish, gradually blending into the buff throat and rufous lower neck. Ears white inside and blackish outside, behind them a nearly naked black area on either side of the black stripe of the nape. Fore legs glossy brownish black. Hind legs rufous to chestnut red but from above the hocks and down to the hoofs glossy brownish black. The tail has basally the colour of the back, on the posterior half some whitish hair are mixed in, and the terminal well developed tuft is proximally black, terminally white, with some rufous hairs mixed in. An ill-defined dark brown streak extends over the chest mesially but disappears near the navel.

The hoofs measure about 37—38 mm. in total length.

The type locality of *Cephalophus harveyi* is Kilimanjaro, and the type-specimen has been pictured in «Book of Antelopes» (Vol. I, Pl. XVII). The Kenia specimen differs a great deal from this coloured plate quoted, especially by its mahagony, not black, coronal tuft, and much darker legs and feet. When TRUE communicated a description² of this Duiker from Kilimanjaro he stated that the tuft is «black», and the forelegs are said to be «entirely dusky». This description evidently agrees with the type specimen in British Museum, because it is termed «excellent» by the authors of the «Book of Antelopes». In the year 1903 THOMAS described *C. ignifer* from Eldoma Ravine and stated then that *C. harveyi* had «no chestnut coronal tuft». LYDEKKER emphasizes again in his book «The Game Animals of Africa»³, as THOMAS before, that Harveys Duiker is distinguished from *Cephalophus ignifer* «by the black forehead and the absence of chestnut in the head-tuft». The tail of the typical specimen of *Cephalophus harveyi* as represented on the plate in «Book of Antelopes» is quite unlike this organ in the present specimen. This may, however, be due to an error committed by the artist, because the Natal Duiker on Pl. XVI of the same work has been pictured with a tail equally hairy along its whole length, although, as I have stated on typical specimens from Natal in this museum, the tail of the Natal Duiker is thin basally and carrying a terminal tuft, just as this organ is represented in *C. nigrifrons*, and *C. ogilbyi* on Pl. XVIII of the work quoted.

¹ It is quite probable that specimens living at a higher altitude on Kenia will prove to have somewhat longer hair.

² Proc. U. S. Nat. Mus., Washington 1892, Vol. XV, p. 476.

³ London 1908, p. 153.

The question is now whether the other differences between typical *C. harveyi* and the present specimen which have been referred to are constant or not. If they are constant, they evidently characterize a local race which then ought to be termed *C. h. keniaë*.

The dimensions of the skull of my specimen, an adult female may be seen from the following table of measurements:

Total length of skull	171 mm.
Condylolbasal length	163 "
Basiscranial length	151 "
Zygomatic width	77 "
Distance from anterior brim of orbit to tip of premaxillary	88 "
Length of nasals	58 "
Interorbital width	42 "
Length of upper molar series	(48,5) 49
Length of palate from mesial notch	88 "
Bulla	11 × 19 "

These dimensions differ somewhat from those recorded by TRUE (l. c. p. 476) for an adult male skull of *C. harveyi* from Taveta, but this difference may be due to the larger size of the buck than the female. The mesial notch of the palate in the present specimen extends to about the middle of m^2 , and the lateral notches to the front of m^3 .

The red Forest Duikers of different parts of Africa are evidently closely allied and, at least partly, only geographical races of one and the same type substituting each other. This is seen not only in the general colouration, but also in the shape and dimensions of the skulls, although, as THOMAS has proved, the western *C. nigrifrons* and *C. claudi* have longer preorbital portions of their skulls. The present specimen approaches in some respects *C. ignifer* THOMAS¹ of Eldoma Ravine and may be regarded as connecting that race with *C. harveyi*. *C. ignifer* differs from the present race in having: 'inner side of forearms, inguinal region, and inner side of thighs white',¹ while there is nothing white there in *C. h. keniaë*. The broad black blaze of the latter appears also to be a good characteristic, while in *C. ignifer* the forehead is 'mixed rufous and black'.

Red Forest Duikers are not uncommon in the thick forests at Nairobi where I secured the specimen described above, and I saw and shot another specimen in a forest two hours march north of Meru boma but lost that one, because it was impossible to follow the blood track in the darkness of the forest. In consequence of its habits of living in thick woods with rich undergrowth it is seldom seen and difficult to obtain, in the dense cover where only twilight prevails. But if it moves over a place where the daylight penetrates its chestnut red coat at once attracts the eye.

¹ THOMAS: Proc. Zool. Soc., London 1903, p. 226.

Cephalophus abyssinicus hindei WROUGHTON.

WROUGHTON: Ann. & Mag. Nat. Hist., Ser. 8, Vol. V, 1910, p. 273.

A fine male Duiker shot at Punda Melia ¹/₁ 1911 agrees with WROUGHTON's description (l. c.). It can be added that the present specimen has a blackish spot on either side of the white chin.

As WROUGHTON had a young male as type, and in addition to that a skull of an old male, the following measurements of my specimen may be of value for comparison.

Greatest length of skull	167 mm.
Condylobasal length	158
Basiscranial length	146
Greatest width of skull	74.7
Length of nasals	60
Length of palate (mesially)	82.5
Length of upper molar series	47
Muzzle in front of premolars	50
Length of horn in straight line	110

This Antelope appears to be fond of high grass in which it can hide. It was observed at Kagio, Kutu, and on the steppe near Rooruka river in addition to the locality mentioned, and is probably common. Those seen by me were always single.

A young kid was found in a bush near Blue Post ²⁰/₁ 1911.

Rhaphicercus neumanni MATSCHIE.

MATSCHIE: Die Säugethiere Deutsch Ost-Afrikas, p. 120.

This little Antelope is not uncommon in bush-steppe and perhaps also in grass-steppe, although I have less experience of the latter kind of landscape.

A gravid female was shot in bush-steppe not far from Thika River and Blue Post 20 Jan. 1911.

Nesotragus moschatus VON DÜBEN.

SCLATER & THOMAS: Book of Antelopes, Vol. II, p. 51

Strange to say the little «Suni» does not appear to be recorded in the scientific literature further in land than from the Kilimanjaro district except that J. A. ALLEN recently has mentioned a specimen from the Kijabe. In his book «The Game Animals of Africa» (London 1908) LYDEKKER says that its distribution on the mainland is «from Kilimanjaro to Mozambique». ¹ I found it to be very common in the

¹ l. c. p. 186.

forests around Nairobi, and even so far north as in the forests at Meru boma. In the forests of Kenia I saw heaps of its droppings a little everywhere and found the remains of its skull at a Wandorobbo fire-place at an altitude of about 2,700 m.¹

I have compared skins and skulls of the 6 specimens which my license permitted me to shoot with VON DÜBEN's type specimens, kept in this museum, and also with some specimens from Kilimanjaro. With regard to the colour there is a certain variation, some specimens being more reddish others more dark, chestnut brown. The darkest specimen in my collection is a female shot at Meru boma. It agrees in colour best with a male from Kilimanjaro.

With regard to the skulls there is a considerable variation in the degree of development of the nasal process of the premaxillary. In VON DÜBEN's type this process is short and pointed, and separated from the anterior end of the lacrymale by an interspace of about 7 mm. along which the maxillary and the nasal form a suture with each other. In all specimens of my collection the nasal process of the premaxillary is more strongly developed and extends rather broadly backwards so that it meets the upper anterior end of the lacrymale and fully separates the maxillary and the nasal from each other. I believed at first that this should be a racial characteristic, but when examining the Kilimanjaro specimens I found them to be intermediate. They have the interspace between the tip of the nasal process of the premaxillary and the anterior end of the lacrymale shorter than in the type, and the suture between the maxillary and the nasal accordingly much shortened. In one of the Kilimanjaro specimens this distance is almost completely reduced. In consequence of this intermediate stage all specimens are retained under the original name.

The size, shape and situation of the premaxillo-maxillary vacuities are subjected to a great variation in my material. They are sometimes large sometimes small, in some specimens only the upper posterior end is left, and in one of the bucks it is practically obliterated as only a small opening entirely situated in the maxillary is left.

The female type is an old specimen, and this is probably the reason why it is broader than my female skulls, because my best buck has a broader skull than the other male skulls. The differences with regard to these dimensions are therefore not of racial value.

The «Suni» was chiefly found in forests with a rich undergrowth of bushes and it was often very dark in its haunts. The first specimen was shot in a thicket, where my gunbearer had detected it, but it was so dark that I only could see the flickering movements of its light tail, and had to aim at that without knowing whether the body was to the right or left of the visible object. The Suni appears to know that it is well protected in this kind of thickets and does not move far when it has been disturbed. It has the same habit as some other antelopes to deliver its excrements in a certain place and, in spite of the small size of the animal, large heaps of its droppings are often found in the woods.

¹ I saw also a specimen on the Mombasa island.

Rhynchotragus guentheri wroughtoni DRAKE-BROCKMAN.DRAKE-BROCKMAN: *Ann. & Mag. Nat. Hist.*, Ser. 8, Vol. IV, p. 51.

When the expedition had crossed Guaso Nyiri to the northern side at the ford on the Marsabit road Dik-diks were found to be rather common in the thornbush. On the first and second days march towards the east from the ford mentioned I shot five specimens of a greyish looking Dik-dik with very short nasals and a well developed proboscis (Pl. XIV, fig. 1), evidently belonging to the *Rhynchotragus guentheri* group. This group which is characterised by the tips of nasals about level with the back of the middle premolar includes *Rh. guentheri* THOMAS with the subspecies *Rh. g. smithi* THOMAS and *Rh. g. wroughtoni* DRAKE-BROCKMAN, and *Rh. nasoguttatus* LÖNNBERG. My specimens from the northern side of Guaso Nyiri appear to differ rather strongly from all these, among other characteristics by their extremely short nasals which do not attain a maximum length of more than about 10 mm., and often less. The premaxillaries are very short and do not reach more than about half way to the nasals. In *Rh. guentheri*, as THOMAS kindly has written to me, there is a small discontinuous remnant of the nasal process of the premaxillary left which reaches the nasal suture, but nothing like this can be seen in my specimens. The maxillaries again extend upwards in front of the lacrymale in the shape of a 4 to 6 mm. broad band which forms a suture of a similar breadth with the nasals. The lacrymale is thus entirely excluded from the margin of the anterior nasal opening. In the fig. of the skull of *Rh. guentheri* in *Proc. Zool. Soc.*, London 1894, p. 324¹ the lacrymale excludes the maxillary from the nasals and I took this for an important difference, but THOMAS has in a letter kindly informed me that this figure is not quite correct. In reality the maxillary reaches the nasal with a short suture in *Rh. guentheri*. The discrepancy in this respect is thus not very important, but the difference in length of the nasals prove completely the distinctness of my specimens from *Rh. guentheri*. The length of these bones is in the latter species 17—17.5 mm., but in my specimens from 8 to 10.5 mm. In addition to this there are also differences in colour which will be mentioned below.

Rh. g. smithi THOMAS was described² on a head skin and a skull from Lake Stephanie. This skull resembles, according to a communication from the author quoted, with regard to the shortness of the premaxillary and the broad suture between maxillary and the nasal the skulls of my specimens. But *Rh. g. smithi* differs markedly from the latter with regard to size. Although the type skull is of a male, all its dimensions are larger even than those of my biggest female skull, in spite of the fact that in these animals, as is well known, the females are always larger than the males. Compared with my male skulls the basiscranial length of *Rh. g. smithi* is about 9 %

¹ Reproduced in *Book of Antelopes*, Vol. II, p. 90.

² *Proc. Zool. Soc.*, London 1900, p. 804.

larger, and other measurements in proportion. The nasals of *Rh. g. smithi* are also longer measuring 14,5 mm.¹

The connection between the maxillary and the nasal by a vertical and somewhat thickened process in front of the lacrymale as described above for the Dik-dik from Guaso Nyiri tends to give more stability to the anterior portion of the skull for the support of the movable proboscis. In this respect the Guaso Nyiri race resembles *Rh. nasoguttatus* from Lake Baringo.² The shape and size of the premaxillaries and the shape of the anterior nasal opening are, however, different in the two Dik-diks mentioned. In the white-spotted species the anterior nasal opening is nearly parallel-sided so that there is not much difference in its width at the naso-maxillary suture (8,5 mm.) and at the posterior end of the premaxillaries (7 mm.), while in the Guaso Nyiri Dik-dik the upper posterior dimension (11—12 mm.) is very considerably larger than the lower anterior (6—7 mm.). The premaxillaries are much stouter and more expanded at the anterior end in *Rh. nasoguttatus* than in my specimens from Guaso Nyiri. The nasals are also longer in the former. With regard to the colour of the fur there is no trace of white spots neither on the nose and face, nor on the feet of the present specimens. The sides of the body are less suffused with yellowish than in *Rh. nasoguttatus*, and the hind quarters are almost pure grizzled grey. Even on the back there is a less yellowish tinge in these specimens.³ The general colour of the back and upper sides is comparatively dark, grizzled by yellowish buff to buffish white subterminal rings, and dark brown to black tips to the hairs. The same dark colour is also found below the pale rings but the concealed parts are dark smoky grey. The neck is paler and more coarsely grizzled grey, because the subterminal rings are broader and almost pure white. The lower flanks are paler than the back and of another colour which is a little different in different specimens. The dark tips to the hair are there so thin that they do not influence the colour. The rings are white, and the colour just below the rings is sometimes the palest shade of dark fawn (Rép. de Couleurs N:o 307), sometimes more reddish similar to 'dead leaf' (Rép. de Couleurs N:o 321. i) but in other examples more greyish; the concealed parts of the hair are here the palest shade of smoke grey inclining to whitish.

¹ The skull of *Rh. thomasi* has not been described by NEUMANN, and it is thus uncertain whether it belongs to this group or to the *Rh. kirki* group as the describing author says. Its colour is different as will be mentioned below.

² When writing about this latter Dik-dik in his book: »The Game animals of Africa» (London 1908, p. 194) LYDEKKER is doubtful whether the white spots on the nose of this animal form a constant characteristic. I am fortunate with regard to this to quote the Game Warden of Brit. E. Africa Mr. R. B. WOOSNAM, who told me as an interesting fact that in the Lake Baringo district every Dik-dik shot, proved to have white spots on its nose. Mr. WOOSNAM did not know then that I had described this animal. — In Sitz.-ber. d. Ges. Naturforsch. Freunde, Berlin 1910, p. 351, Dr. A. BERGER writes: »Am Baringo See fanden wir dieses merkwürdige Tier [*Rhynchotragus nasoguttatus* LÖNNB.] sehr häufig in der steinigen Dornbuschsteppe.» — DRAKE-BROCKMAN (Proc. Zool. Soc. London, 1911, p. 978) has found white spots on the nose »in a large proportion of the Dik-diks in Somaliland», and he believes this not to be constant there. Even if *Rh. nasoguttatus* should not always be provided with such spots it is plainly characterized by its cranial dimensions, colour etc. It may also be remembered that when it was described and named nothing had been mentioned before about white spots on Dik-diks, and the name was thus fully justified.

³ If *Rh. thomasi* should belong to this group it is entirely different in colour as NEUMANN says about it: »das ganze Fell mehr einfarbig rotgelb aussehend» than *Rh. hindei*.

The belly and under parts generally are pure white, sometimes with sharp limitation, sometimes with a narrow pale isabelline band bordering the lower flanks. The throat is also white but the lower side of the neck is like its sides grizzled, although with still more white. The face and muzzle buff (Rép. de Couleurs 309. 3), the sides of the head like the neck. A white eyebrow-mark is present. The crest of the males is black with broad whitish subterminal rings on the anterior, and rufous buff rings on the posterior hairs. In the females the crest is much shorter, and its posterior portion consists of rufous hairs with long black tips. There is thus a considerable difference between the sexes with regard to the crest as well. The feet are a little paler buff than the face.

With regard to the pure white of the lower side these specimens agree with *Rh. guentheri wroughtoni* DRAKE-BROCKMAN but differ from *Rh. guentheri* in which, according to the author quoted¹, the yellow grizzling fades somewhat gradually into the pale pinkish buff of the chest and abdomen. It is thus also with regard to the colour easy to distinguish these specimens from *Rh. guentheri*, but it is more difficult to express any opinion about their relation to *Rh. g. wroughtoni* a single specimen of which has been shortly described from the foot hills of Mt. Akul Kassim, Wabi River Gallaland, Abyssinia within 20 miles west of Sheikh Hussein. To make sure about the identity I took the liberty of sending one of my specimens to Brit. Museum for comparison with the type of this subspecies, and Mr GUY DOLLMAN kindly replied that the colour is exactly the same, both as regards pattern and tint.

With regard to cranial measurements the type of *Rh. g. wroughtoni* is similar to the present specimens except that it has considerably longer nasals viz 13 mm. But DOLLMAN's comparison settles the question. It is therefore to be assumed that the type specimen of *Rh. g. wroughtoni* had unusually long nasals and that these bones vary in length more than hitherto has been known. DRAKE-BROCKMAN has said that the ears of *Rh. g. wroughtoni* are longer and broader than in other species except *Rh. cavendishi*, but exact measurements are not given for either of these. The length of the ear of the specimens from Guaso Nyiri is about 94 mm. and the length of the opening of the ear-conch is about 73 mm. The latter measurement is about similar to that of *Rh. nasoguttatus*.

DRAKE-BROCKMAN's description is rather short, and I have therefore discussed these specimens somewhat fully to show the variability of the species and make it better known for the future. For the same purpose the accompanying table of measurements of five skulls has been prepared. The type locality of DRAKE-BROCKMAN's subspecies is situated very far from the one where my specimens have been collected and this appeared to begin with to speak against the identity as the Dik-diks often have a rather restricted habitat.

¹ Ann. & Mag. Nat. Hist. Ser. 8 Vol. IV, p. 51.

	♂	♂	♀	♀	♀
	mm.	mm.	mm.	mm.	mm.
Total length	108	107	115	111	110,5
Condylobasal length	101	100,5	109,5	104	103
Basicranial »	94	94	102,5	97	96
Zygomatic width	54,5	54,5	54	53	55,5
Posterior brim of orbit to gnathion	80	79	84	81	81
» » » » anterior alveolar edge	54	54	57	55	57
Length of nasals	8,5	—	10	8	10,3
Tip of nasals to gnathion	45	—	50	48,5	43,5
Length of upper molar series	37	34,5	38	37	35,5
Length of horn	67	65	—	—	—

This grey Dik-dik was rather common in the thornbush in the localities mentioned especially on rocky hill-sides. It occurred as other species in pairs. When I had shot the first pair of this kind ¹³ 1911 one days march to the east of the Marsabit road I wrote in my diary: «The two Dikdiks shot to day have a soft and long, rather tapire-like nose (Conf. Pl. XIV fig. 1), just as the *nasoguttatus* mounted in the museum in Stockholm. They look rather long-legged when they do not run fast. When first started the make some stiff jumps (like several other antelopes) before they begin to run. Sometimes they stop soon and look round.»

Rhynchotragus cavendishi minor LÖNNBERG.

LÖNNBERG: Ann. & Mag. Nat. Hist. Ser. 8, Vol. IX, p. 65.

When the Expedition had passed eastwards to below Chanler Falls another Dik-dik was met with. This one was more yellowish in colour, and its nasals were not so short as in the grey species seen a few days before. It belonged evidently to the *Rhynchotragus kirki* group. To this group can be counted *Rh. kirki* GÜNTHER, *Rh. k. hindei* THOMAS, *Rh. cavendishi* THOMAS, *Rh. thomasi* NEUMANN, and *Rh. damarensis* GÜNTHER. For geographical reasons as well as for differences with regard to the skull the last mentioned species does not need to be compared with the present specimens. When describing *Rh. thomasi* NEUMANN has, as usual, not cared to give any skull measurements but only described the colour of the animal.¹ As this is said to be «rotgelb» it cannot be regarded to resemble my specimens at all. *Rh. cavendishi* THOMAS is a large species with the basicranial length in the male type-specimen 104 mm. thus very much more than in the present specimens (conf. table of measurements), and other dimensions differ in similar proportions. In some respects, however, my specimens resemble *Rh. cavendishi* viz. in the development of the premaxillaries which are said to reach the nasals, «articulating broadly» with them, and

¹ Sitz.-ber. d. Naturf. Freunde, Berlin 1905, p. 89.

with regard to the comparatively long nasals. In *Rh. kirki* GÜNTHER again the nasals are very much shorter than those of the present specimens, hardly measuring ² as much in length, and it has slender premaxillaries, their ascending process sometimes ending just above the anterior tooth, and sometimes rising nearly or quite to meet the nasals.¹ The shape and size of the premaxillaries is also shown by GÜNTHER's figure of the skull of *Rh. kirki*. This is quite a considerable difference, in spite of the variability, from the condition found in the present specimens in which the premaxillaries are gradually widened so that their suture with the nasals amounts to 6–8 mm. It is also unlike the condition in *Rh. k. hindoi* THOMAS about which the describing author says: 'premaxillæ just touching nasals above'.² It is evident that the broad connection between the premaxillary and the nasal gives a greater firmness to the anterior portion of the skull which serves to support the proboscis than in such forms in which no such connection is to be found. The solidness of this portion of the skull is still more increased in my specimens from Guaso Nyiri by the premaxillaries being somewhat thickened when compared with the thin transparent lamina of the maxillary and the lacrymale which form the lateral wall of the nasal cavity.

Considering the structure of the anterior portion of the skull it appears suitable to regard these my Dikdiks as forming a subspecies of *Rh. cavendishi* which in consequence of its small size may be named *minor*.

The general colour above is a grizzled yellowish grey produced by buffish yellow subterminal rings and dark brown tips to the hair, which basally are greyish brown. The middle of the back is more brownish. The neck looks paler greyish, and less yellowish because the subterminal rings are there dirty whitish. The flanks are less grizzled and paler than the back, about sand-coloured, sometimes more, sometimes less suffused with buffish. Surroundings of the tail and posterior parts of hams pure ashy grey. Lower parts suffused with buff, only the middle of the belly and inside of hams being pure white. Lower neck pale yellowish grey, throat white in the middle, suffused with buff on the sides. Legs and middle of the face fulvous buff, sides of face paler almost sandy. A white spot around the eye. Anterior shorter portion of crest ringed with buffish white and dark brown, but the greater posterior portion dull fulvous buff with hardly conspicuous dark tips to some of the hairs. Ears sand-coloured on the outside, white within, with a black line along the upper half of the outer margin as well on the outer as on the inner side.

The females have a smaller crest the hairs of which are very broadly tipped with black.

¹ Book of Antelopes, Vol. 2, p. 83 and p. 85 fig. 29.

² Ann. & Mag. Nat. Hist. Ser. 7, Vol. X, p. 243.

	<i>a</i>	<i>b</i>	<i>c</i> var.!	<i>d</i> ¹
	♂	♂	♂	young
	mm.	mm.	mm.	mm.
Total length	168,5	105,5	98,5	100
Condylobasal length	102	98	92	95
Basiscranial "	94	92	85	88
Zygomatic width	34	50	50	47
Posterior brim of orbit to gnathion	76	77	73	72,5
" " " " " anterior alveolar edge	53	51,8	50,5	51,5
Length of nasals	21,5	23	15,3	19,5
Tip of nasals to gnathion	30	30	30,5	30
Length of upper molar series	35	34	33	—
Breadth across posterior orbital walls	55	51,5	49	47,5
Distance between outer sides of horn cores basally	42	40	36,5	—
Combined breadth of nasals	15	16	15	15

The cranial measurements of this race are recorded in the accompanying table of measurements. As can be seen from the same, one of the skulls measured (termed *c* ♂ in the table) is very much smaller than the two typical males (*a*, *b*), in spite of the fact that it is fully adult. The skull *c* looks also very different when compared with the others especially because the distance between the horns is smaller and the nasals shorter. I am, however, inclined to regard it as an individual aberration, a dwarf, because the skin is quite like the other male skins except that the tuft is smaller and the black tips to the hairs of its posterior portion a little more conspicuous than in the typical males. But it is not excluded that it represents a smaller but related race as it was found at another locality, although not much distant.

This small buck was shot at Njoro a watering place belonging to the Rendiles about 2 days march north of Guaso Nyiri (² 1911). In the same neighbourhood a female Dikdik was also shot, but this was unfortunately so young that its dimensions are of little value.

These Dikdiks were common in the thornbush country north of Guaso Nyiri below Chanler Falls. In habits they resembled the other species. A few times I heard them produce a kind of whistling sound like *iii*, and a snort when they were started.

Kobus ellipsiprymnus canescens n. subsp.

The specimen on which OGILBY based the specific name *ellipsiprymnus* was brought from South Africa, although the exact locality hardly is known with certainty.³ All Waterbucks with a white line across the rump have afterwards been

¹ The milk-molars still remain, and m³ is cutting the gum.

² Conf. W. L. SCLATER: Mammals of South Africa. Vol. I, p. 187—188.

referred to this species until MATSCHIE recently created two subspecific names *K. c. pallidus* from Shebelli, Somaliland, and *K. c. thika* from Thika river, Brit. East Africa. The first of these names is based on two immature specimens; It is thus uncertain whether the characteristics quoted by MATSCHIE are constant. These are: »The ground-colour is not a mixture of grey and russet brown but very light brown without any reddish tint. The white eye-stripe reaches only 2.5 cm. beyond the eye in front» — — —. The light colour may stand in correspondence with the youth of the specimens. If the second characteristic is constant, it distinguishes *K. c. pallidus* from my specimens from Guaso Nyiri. The white eye-markings are also much larger in the latter which hardly can be explained by their greater age.

The Thika-race, based upon an adult buck from Thika river, is said to be characterized by its »tief dunkelbraune Färbung und dadurch dass die Hüftbinde auf der Mitte des Hinterrückens unterbrochen ist». The last of these characteristics does not need to be constant in a race of Waterbucks, as can be judged from the fact that in one of my bucks from below Chanler Falls, and in the cow shot near the crossing of the Marsabit road on the northern side of Guaso Nyiri such an interruption of the rump-band takes place, but not in the other buck, although it was shot at exactly the same place as the first. Concerning the description of the colour of *K. c. thika* there are also several discrepancies from my specimens. One of these is that in *K. c. thika* »auf der Mitte der Brust befindet sich ein grosser weisser Fleck». No such marking is to be found in my specimens. The latter appear also to be less dark, especially on throat and chest, which are said to be »warm-sepia-farbig oder russfarbig (Rép. de Couleurs 305. 1) mit grau gemischt» in the Thika-race, while the corresponding parts of my specimens rather deserve to be termed pale smoke grey somewhat tinged with brown (conf. below). As it could have been suspected that such a white spot on the breast as that mentioned in the description of *K. c. thika* might be an individual variation, I took the liberty of writing of Prof. MATSCHIE and asking him about this. But in his reply he declined the possibility mentioned saying: »Dass die breite weisse Stelle auf der Brust meines *Kobus ellipsiprymnus thika* individuell sein sollte, glaube ich nicht; so etwas als Variation habe ich noch nicht gefunden.» Concerning the colour of throat and chest in *K. c. thika* the author also kindly gave the following explanation: »Die Kehle und Brust sind sehr dunkel, die Warm-Sepia-Farbe herrscht vor, der Rücken ist nur rötlicher.» Since MATSCHIE this way had still more sharply defined the characteristics of the Thika Waterbuck I must state that my specimens from Guaso Nyiri cannot be counted to the Thika race as I had expected. The following description proves more fully the differences. The back is grizzled, the ground colour being hoary or whitish grey overlaid with »warm sepia» (Rép des Couleurs» 305. 2). The warm sepia colour dominates over the hoary on the rump, and also, although less markedly, above the shoulders. Towards the sides the warm sepia fades more and more and is replaced by »otter brown» (»Rép. de Couleurs 354) beginning with darker shades and finally passing to the lightest on the lower flanks where the light grey wholly dominates. The under parts are whitish with an

»otter brown» tinge. The shoulders and hams are thinly overlaid with »warm sepia» passing into »otter brown». The ground colour of the upper neck is hoary grey rather thickly overlaid with »warm sepia» (395. 1). The face is »warm sepia» (305. 2) paler and mixed with hoary grey; on the sides the forehead is »burnt umber» (Rép. de Couleurs, 304. 2) somewhat mixed with »warm sepia». The ears are the palest shade of »dark fawn» (Rép. de Couleurs, 307. 1) fading to whitish towards the outer margin of the basal half, but inclining to »warm sepia» on the upper margin and the tip, white inside. The white eye-mark is well developed, fully 3 cm. broad and extending about 7—8 cm. in front of the eye. A broad white band around the muffle. The chin is white beyond the angle of the mouth. The interramial space between the white chin and the white throat spot is whitish, tinged with »otter brown». The lateral angles of the white throat spot do not reach the base of the ears. The lower side of the neck smoke grey, the hoary grey being tinted with brown. Nothing white on the chest. The white rump band is about 3 cm. broad and interrupted dorsally in the middle for about $2\frac{1}{2}$ cm. in one of the bucks. The tail is warm sepia above and on the tuft, white below. The fore legs below the »knee» are »warm sepia» (305. 2) in front, »chocolate» (343. 2) on the sides and behind; the white band around the hoofs and false hoofs is narrow. The hind legs below the tarsal joint are »dark fawn» (307. 4) in front, more blackish behind.

The cow is generally paler, the »warm sepia» tint on the back of the buck being substituted by a corresponding tint of »brownish drab» (302), and the colour of the lower legs nearest to »raw umber» (301).

In addition to what has been already mentioned concerning the colour of the neck and the breast it may be concluded from this description that the Waterbucks from Guaso Nyiri (Pl. XIV fig. 2) are considerably paler than the Thika race. The back of the latter is said to be »rötlich sepiafarbig», but there is no reddish tint in the former. The Thika race has »die Körperseiten nur ganz wenig mit grau getönt», while there is more grey than sepia on the corresponding parts of the Guaso Nyiri specimens. In the Thika race »die Weichen sind heller, sehr hell umbrabraun» (Rép. de Couleurs 301. 1 aber etwas grauer) in the Guaso Nyiri specimens there is no trace of »raw umber» on the lower flanks. The ears are also much paler in the Guaso Nyiri race.

It appears also to be paler than the typical South African race, which at the same time is considerably larger as can be seen from the cranial measurements recorded below.

	»Caffraria» Inholuba	Brit. E. Afr.	Guaso Nyiri
	♂	♂	♂
Basiscranial length	380	340	330
Condylobasal length	400	358	355
Greatest breadth	178	158	157
Distance from orbit to tip of premaxillaries	245	220	225
» » occipital condyle to front margin of orbit	204	183	176
Length of nasals	156	144	156
» » upper molar series	108	101	106

The length of the horns of my two Waterbucks is, measured along the anterior curve, about 57–58 cm., and two other bucks shot for trophies by Mr. STRÖMBERG near the same place had exactly the same length of the horns so that this measurement appears to be the normal at Guaso Nyiri below Chanler Falls, but the spread of the horns varies considerably. It was in these four bucks about 22¹/₂, 27¹/₂, 29, and 32 cm.

The measurements of the typical skull of *K. c. thika* is a little larger than the Guaso Nyiri skulls the basal length being 349 mm. according to MATSCHIE (l. c. p. 411), and the greatest breadth 162 mm. The distance between the posterior surface of the occipital condyle and the anterior margin of the orbit is in MATSCHIE's type specimen 185 mm. also nur 23 mm. länger als die grösste Breite des Schädels. MATSCHIE lays much stress upon the great breadth of the skull of *K. c. thika*, and he appears to regard this as a typical characteristic of that animal. If a comparison is made between the basal length of the skull and its greatest breadth, the latter measurement is found to be 46% of the former according to MATSCHIE's measurements of *K. c. thika*. In a similar way the corresponding percentages for the skulls of my two Waterbucks from Guaso Nyiri prove to be resp. 46, and 47, and the difference between the greatest breadth of the skull and the distance between the occipital condyle and the front margin of the orbit is resp. 25 and 19 mm. But this great relative breadth of the skull is nothing characteristic of the northern Waterbucks of the *ellipsiprymnus* group alone. The measurements of a skull of a Waterbuck from South Africa recorded above show that the breadth of the same is 46% of the basal length there as well. These proportions are thus alike in southern as well as in northern specimens.

To judge from MATSCHIE's measurements of the typical skull of *K. c. thika* it appears to be a little larger than my two skulls from Guaso Nyiri but the difference is not great and might easily be individual. For the present no other cranial differences of importance can be pointed out, and it is thus rather uncertain whether the differences in colour and pattern justify the creation of a different subspecies for the Waterbucks of the Guaso Nyiri district. Against MATSCHIE's formal declaration it is, however, difficult for the present to identify his very dark *K. c. thika* with my pale specimens from Guaso Nyiri, and although unwillingly I have felt myself compelled to give them a separate name until the question can be fully solved by more material.

The paleness of the Waterbucks along Guaso Nyiri appears to reach its extreme in some individuals at and near the Lorian Swamp, where I heard that 'white Waterbucks' had been repeatedly observed. Such a one is reported in Proc. Zool. Soc. London 1905 II p. 297, and in 'The Field' the 'white Waterbucks' from this locality have been mentioned more than once, and it has been stated that the eyes of these white specimens are 'of the normal colour, not pink'.¹ This makes this white variation to something more than the common pathological pink-eyed albino which now and then occurs among many different species of mammals.

¹ Conf. also the Extract in The Journal of the East Africa and Uganda Nat. Hist. Soc. Vol. II, No 3, p. 75.

Waterbucks were seen near Lekundu river, and on both sides of Guaso Nyiri from the ford on the Marsabit road to some distance below Chanler Falls. Often 5 to 8 or more cows and immature animals were seen together but no buck. At other opportunities single bucks, or a few bucks in company were observed or a buck with some few cows. They were always found near the river, but often on very bad and stony ground. They were not very shy. When first observed close to the river they usually took their refuge to higher ground and trotted up on stony hills with great dexterity. The grey fur harmonized completely with the grey, leaf-less bush but they were, of course, very easily seen as they did not try to hide and their contour-lines always betrayed them. They have a more deer-like and stately carriage than any other antelope, because they hold head and neck high.

Redunca sp.

At two different opportunities not far from Nairobi I saw a Reedbuck, but it was on private ground where I had no right to shoot, so that I could not ascertain which species it represented.

Æpyceros melampus rendilis n. subsp.

In the thornbush country north of Guaso Nyiri I collected the material of Impala Antelopes which I was entitled to by my licence viz. 4 specimens and selected two good bucks (Pl. XIV fig. 3), a young buck with still almost straight horns (Pl. XIV fig. 4) (m^h not yet up), and a female. When I had come home and compared my material with specimens from Kilimanjaro (collected by SJÖSTEDT) which must be regarded as representing *Æ. m. suara* MATSchie I found that the difference in colour is quite conspicuous. My specimens are irrespective of age and sex alike and much darker than the Kilimanjaro specimens which display a much redder general colouring.

The general colour of the back of the Guaso Nyiri race is «fawn» (Rep. de Couleurs 308. 4 in ♂, 308. 3 in ♀), and darkens in the bucks on the posterior back to «madder brown» (Rep. de Coul. 334. 4). In contrast to this the colour of the Kilimanjaro specimens is the same shade as «dead leaf» (Rép. de Coul. 321. 3 & 4) but brighter. The line of demarcation in the Guaso Nyiri specimens is quite sharp, and the colour of the sides is «dark fawn» (Rép. de Col. 307. 1), while the colour of corresponding parts in the Kilimanjaro specimens is «buff» (Rép. de Coul. 309. 1). The white above the eye, on the chin and throat is similar in both races. Below and in front of the eye, below the continuation of the white eyebrow-stripe there is in the Guaso Nyiri specimens a blackish, not sharply defined but well visible patch which I have not seen in a buck from Kilimanjaro, but which may be faintly traced in a ewe from the same place. (The authors of the «Book of Antelopes» say that this patch «is never present in northern» specimens, and it may thus be of some importance.) The black

patch on the crown is present in both races. The colour of the face is fawn with a dusky blaze in the Guaso Nyiri race (Pl. XIV fig. 3), more bright rufous in the Kilimanjaro specimens. The colour of the outside of the ears is dark fawn in my specimens, buff in those from Kilimanjaro, the terminal portion is black in both. The mesial dark dorsal streak is in consequence of the general dark colour not very apparent before it becomes black on the rump, and it is continued on the tail, where it, however, is concealed in the bucks by the long white hairs on the terminal portion of this organ. The black stripes on the buttocks, and the black tufts on the hind legs are developed as usual. The black spots as well on fore as hind legs in the place where the lateral hoofs are situated in other antelopes, and the black spot on the heel are perhaps more pronounced than in the Kilimanjaro race.

These differences in colour between the Impalas from Guaso Nyiri and Kilimanjaro are also supported by cranial differences as the following measurements indicate.

	Guaso Nyiri			Kilimanjaro	
	♀	♂	♂	♂	♀
	mm.	mm.	mm.	mm.	mm.
Basicranial length	245	254	257	—	242
Condyllobasal length	262	274	272	—	258
Greatest breadth	108	114	118	—	104
Interorbital breadth	71	74	79	72	71
Greatest length of nasals	87	100	99	81	83
Greatest breadth of nasals	35	33	39	29	29
Breadth of nasals at the end of the nasopremaxillary suture	21	24	24	20	20
Distance from orbit to tip of premaxillary	162	169	170	159	160
Length of upper molar series	81	78	80	76	71

The length of the horns of my two Impala bucks, which are to be regarded as good average specimens, measure about 73 and 66 cm. along the front curve and the distance from tip to tip is resp. 43 and 53 cm.¹

The Impalas of German East Africa appear to be smaller with shorter and especially narrower nasals. The difference is not very great, but I think it is the best proceeding to name the Impala of the thornbush country north of Guaso Nyiri as a separate geographic race which is called *rendilis* after the nomadic tribe inhabiting this country. Concerning the colour it could almost have been expected that the inhabitants of this arid region should have been paler instead of being rather darker.

¹ The spread of the horns is, as is well known, very variable, and sometimes one of the tips is nearer the median line than the other. A good example of this was an Impala which I saw in Nairobi and which probably was from Sotik. The spread of this was not less than 68 cm., but the tip of the right horn was only about 25 cm. from the median line. — Some ultramodern zoologists would probably term such a specimen a hybrid!

In the thornbush country the Impalas occurred in small flocks usually counting from 7—8 to about 15. As has been observed at other localities as well, such a flock sometimes consists of a good buck and a number of females and young bucks which not yet have fully developed horns, sometimes there are no adult buck at all to be seen in the flock, and sometimes 7—8 adult bucks live together without having a single female or young buck in company. It is more seldom single bucks wander alone or only two in company. When we were camping at Guaso Nyiri the Impalas were as a rule seen near the river, and at the water-places Njoro and Thera as well they lived not far from the water-holes. When not on the move their favourite haunts appeared to be the bushes fringing the dry beds and ravines of the small rivulets and water-courses. There the Impalas have a good cover. Often some evergreen bushes grow in such localities, and these may be the only green food available during the dry season in this country.

When alarmed they warn the others with a sharp sniff or whistling snort and make some wonderful bounds high above the bushes before they start on their regular flight in a certain direction with full speed. It is evident that they make these high leaps out of curiosity and to try to find out from where and from whom the danger threatens.

On the acaciasteppe south of Guaso Nyiri Impalas were seen in bushes near Lekimundu river, but as I did not shoot any specimen there I cannot tell whether they were of the same race as those of the thornbush.

***Gazella thomsoni* GÜNTHER.**

SCLATER & THOMAS: Book of Antelopes, Vol. 3, p. 171.

The beautiful little 'Tommies' are still common on the plains around Nairobi and at Juja farm. Unlike the Grant gazelles they do not extend their distribution much further north east. Like the Kongoni and the White-bearded Gnu they were non-existent on the acacia-steppe south of Guaso Nyiri. They belong thus to the East African fauna in a restricted sense.

Where they are not pursued the Tommies are the most confiding of the antelopes of the plains, but where they are often shot at, they become very shy and run for their lives even at very long distances, and long before they are within range for a rifle.

***Gazella granti* BROOKE.**

SCLATER & THOMAS: Book of Antelopes, Vol. III, p. 179.

Not less than six subspecies of Grants Gazelle have been named and these have been reviewed not long ago in LYDEKKER's book on the 'Game Animals of Africa' (1908). The variability of the species is, however, great and, although some of the races appear to be well defined, it is sometimes rather difficult to form a

definite opinion about certain specimens. For instance, a typical head of *G. g. robertsi* is very easy to recognize on its horns the tips of which point outwards and backward and thus have a great spread. Horns of *G. g. robertsi* about which there could be no mistake I saw brought from Sotik. On the other hand it is not uncommon that a dispute arises whether a certain pair of horns shall be regarded as *G. g. granti*, or *G. g. robertsi*, and I remember that I have been in uncertainty myself about this when once called to settle a controversy on such a matter. This proves that there are intermediate links between these races.

The Grant Gazelle of the Athi plains near Nairobi, and in the southern Game-reserve belongs to the typical *G. g. granti*, while *G. g. petersi* with more parallel horns, and the colour of the back reaching the root of the tail is found at lower Tana and Sabaki rivers, thus nearer the coast.

G. g. notata is said to live in the country from the highlands southwards and south-eastwards of Lake Rudolf to the Guaso Nyiro-valley and Mount Kenya (LYDEKKER l. c. p. 262). Judging from this I expected to find the race mentioned in the country round Guaso Nyiri. This was, however, not the case. The characteristic of *G. g. notata*, from which also the name is derived, is that it shall have the body-markings much intensified. Dark and light lateral bands much longer and broader, the former nearly black and reaching forwards on to the shoulder, and backwards nearly to the white rump-mark; the latter pale buff, and succeeded above by a second dark band, lighter than the main lateral band, but distinctly darker than the centre of the back. This second dark band united with the other behind the posterior end of the light band. Pygal band black and very strongly defined (SELAGER & THOMAS l. c. p. 191). The Grant Gazelles on the acacia-steppe at Lekimundu river near but south of Guaso Nyiri had, however, no such appearance, nor their congeners in the thornbush on the northern side of the latter river. Instead of having intense markings they were very pale all over, and the markings obsolete. There are two such subspecies described viz *G. g. brighti* THOMAS, and *G. g. lacuum* NEUMANN. The former which LYDEKKER terms the Lado race is said to inhabit the country between Lake Rudolph and Lado. The latter the Abaya race is from the surroundings of Lake Abaya, or vom Znai-See bis zum Gandjule-See. *G. g. brighti*¹ is fully described and characterized by its pale colour and absence of dark lateral bands in all specimens of any age. This race has also comparatively short horns and a growth-boss at their anterior bases retained into adult life. About *G. g. lacuum* it is much more difficult to get any clear idea. It is said to be somewhat smaller than *G. g. granti* and provided with straight horns. The dark lateral band is said to be conspicuous in young animals, and present but indistinct in old females. The dark pygal band is said to be less developed than in *G. g. granti* and the white rump-patch smaller. The horns shall be longer than in *G. g. brighti*.

Considering all it appears most likely that my specimens are more nearly related to the race named *G. g. lacuum* than to any other but, although in the following I

¹ Proc. Zool. Soc., London 1900, p. 805.

am going to use this name, I do not think that it signifies at all a form other races sharply defined form, but most probably such a one which merges gradually as well into *G. g. granti* on one hand as into *G. g. brighti* on the other.

***Gazella granti lacuum* NEUMANN.**

NEUMANN: Sitz. ber. Ges. naturf. Freunde, Berlin 1906, p. 243.

The Grant Gazelles on the acacia steppe south of Guaso Nyiri around Lekiundu river do not differ much from the typical *G. g. granti* except that they are paler and the dark spot on the muzzle of the bucks is smaller and less pronounced. The dark pygal band is present but not very sharply defined and sometimes it can hardly be traced (Pl. XIV, fig. 5). In the females the markings as usual are better developed but even in some of them the lateral band is on the verge of disappearing, or quite obsolete. On the northern side of Guaso Nyiri the Grant-gazelles were still paler. The nasal spots of the bucks are often only a faint dusky cloud, and the dark pygal band is practically absent, even if the hairs at that place are a shade darker. In some small herds one or two females were seen with lateral bands, in other herds not a single animal with lateral bands could be detected. This was for instance the case at the water-place Njoro and these animals thus approach *G. g. brighti*, but the horns were longer measuring in a buck shot at that place about 55 cm. along the anterior curves and with a basal circumference of 15.5 cm. Equally pale bucks were shot near Chanler Falls, and the best of them¹ carried horns measuring 63 cm. and with a basal circumference of 17.5 cm. These large horns and their shape which is rather similar to that in true *G. g. granti* prove that these specimens are not identical with *G. g. brighti*. The spread of the horns is as usual among Grant-Gazelles variable. In the specimen from Njoro (Pl. XV, fig. 1) the distance from tip to tip is about 29½ cm. but in those from Chanler Falls only about 19 cm. On the two Lekiundu bucks the same dimension was resp. 23½ and 16 cm.

With regard to the size of the white rump-patch I cannot find any perceptible difference between these animals and typical Grant Gazelles from Kilimanjaro.

Generally speaking these Gazelles are somewhat smaller than the typical race, and the measurements of the skulls as can be seen on the accompanying table agree nearly with those recorded by THOMAS² for the type of *G. g. brighti*. But even the measurements have in this case only relative value, and do not constitute with full certainty distinguishing characteristics. This I have ascertained myself as I have measured skulls of adult bucks of *G. g. granti* from Kilimanjaro which have a shorter condylobasal length than the average of my specimens from Guaso Nyiri, although others were about 20 mm. longer. The smallest of my specimens is the one from Njoro which, however, was a fully adult animal in good condition. This may stand

¹ The females in company with this buck had dark lateral bands according to Mr. CUNNINGHAME's observation.

² Proc. Zool. Soc., London 1900, p. 805.

in connection with the fact that in this arid region food must be scarce for these animals. The buck killed there had chiefly fed on the leaves of an evergreen bush which grew at a dry river-bed.

The first two bucks killed at Lekundu river (Pl. XIV, fig. 5) measured both of them when freshly killed 170 cm. in a straight line from the muzzle to the tip of the tail, and the length of the tail corresponded to 26 cm. out of that. The paler bucks from Chanler Falls were certainly not smaller, although I have no body measurements of them. The buck from Njoro again which, as already mentioned, was my smallest specimen has the basal length of its skull about 12 mm. shorter than the type of *G. g. brighti*.

	Lekiundu river S. of Guaso Nyiri				Njoro	N. of Guaso Nyiri near Chanler Falls	
	♀	♀	♂	♂	♂	♂	♂
	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Condylbasal length of skull	222	221	—	252	242	255	254
Basal length of skull	206	205	—	238	228	236	238
Greatest breadth of skull	99	99	107	107	108	107	108
Distance from orbit to tip of premaxillaries . . .	126	118	137	128	129	136	137
Least interorbital width	53	56	66	66	63	65	62
Length of nasals	51	51	74	56	54	54	67
Upper molar series	76	74	73	79	79	82	79

A study of the cranial measurements recorded above shows that, with the exception of the specimen from Njoro, the other bucks are very much alike. The greatest variation is found in the length of the nasals. One of the bucks from Lekundu has long nasals 74 mm., one of those from Chanler Falls has also comparatively long nasals 67 mm., but in the others they must be termed short. Skulls of the typical Grant Gazelle from Kilimanjaro, often have rather long nasals measuring more than 70 mm. It might thus appear possible that this should be a characteristic of the typical race, and shorter nasals on the other hand of the smaller more northern races. Some of my specimens are then intermediate in this respect as well. But it must be remembered that the variation in this respect is rather great even among the typical Grant Gazelles, and that fullgrown bucks of the latter race may be found with the nasals measuring only little more than 60 mm.

Short nasals stand in connection with a movable muzzle, and for a browsing ruminant such an organ is of importance. The Grant Gazelles of the open plains are grazers, but those of the thorn-bush are at least partly browsers. This may account for the difference in the length of the nasals in different races if constant.

It may be concluded from this that intergrading links between the typical *G. g. granti* of the steppes of Central East Africa, and the paler and smaller races *G. g. brighti* and *G. g. lacuum* of the arid regions further north can be found so that no sharp limits can be drawn between them. The, as it seems, still incompletely known

Banded Grant Gazelle, *G. g. notata* is probably an inhabitant only of somewhat higher altitudes, the Loroghi mountains etc., and does not descend on the hot and arid plains, resp. thornbush country. Its longer fur and richer colouration speaks for such a theory.

HOLLISTER has recently recorded¹ this race from the Laikipia plateau and also given the measurement of a skull which had a condylobasal length of 260 mm., thus larger than that of the pale race described above, but the author quoted says 'there appear to be no constant cranial characters by which skulls without horns of this and the typical race can be separated. The horns are different, however, he says, "spreading but little at the points". The distance between the points is recorded to be 16 cm., thus the same as in one of my specimens from Lekundu. There is thus in this respect as well intergrading specimens to be found.

The Grant gazelles are rather common on the acacia steppe south of Guaso Nyiri. They occurred usually in small flocks, but single as well bucks as females are often seen. In the thornbush on the northern side of the river they were less numerous. In consequence of their pale colour and short, smooth fur they appeared quite white in some shades of light.

Lithocranius walleri (BROOKE).

SCLATER & THOMAS: Book of Antelopes Vol. III, p. 229.

The type locality of the species is said to be the Tsavo plains east of Kilimanjaro. The specimens from Somaliland which already then were known to be larger, were named *Lithocranius sclateri* by O. NEUMANN.² The distinguishing characteristics are said to be, in addition to the difference in size, as follows: The typical *L. walleri* is said to be 'redder' ('röther') than the Somali-race. It shall have black knee-tufts ('schwarze Kniebüschel') and 'das weisse der Unterseite bildet an den Seiten des Schwanzes einen undeutlichen breiten Fleck'. On the other hand, the Somali-race is said to have 'braune Kniebüschel, und das weisse der Unterseite zieht sich seitlich des Schwanzes als feine weisse Linie aufwärts'.

Looking at my three specimens from the northern side of Guaso Nyiri I find that the upper central parts of the knee-tufts are black, but the lower and lateral parts are rufous. It is thus difficult to know whether this characteristic shall indicate *L. walleri*, or *L. sclateri*. The white along the posterior edge of the hams extends as a fine line to the root of the tail, where it expands to a maximum breadth of about 1 cm. in the doe, about 2 cm. in the buck. It is difficult to know what NEUMANN means with his words 'einen undeutlichen breiten Fleck', which should be characteristic of *L. walleri*, but it appears most probable that my specimens in this respect as well are intermediate, between the northern and southern races. The name '*sclateri*' can thus only be regarded to have subspecific value.

¹ Smithsonian. Misc. Coll. Washington 1910, Vol. 56, p. 7.

² Sitzber. naturf. Freunde. Berlin 1899, p. 19.

The horns of my old buck are well developed, although no records they measure along the front curve about 31 cm. with a basal circumference of $13\frac{1}{2}$ cm., and a distance between the tips of $6\frac{1}{2}$ cm.

Concerning the skull NEUMANN says that the nasals and premaxillaries of the typical *L. walleri* are much shorter than those of *L. sclateri*. Fortunately in this case he gives the dimensions of these bones in two specimens of *L. walleri*, and one *L. sclateri*. These measurements which are quoted below are said to be derived from old male skulls as also is the case with mine.

	<i>L. sclateri</i> ♂ ¹ from Berbera (NEUMANN)	My specimen from Guaso Nyiri	<i>L. walleri</i> ♂ ¹ from Pangani (NEUMANN)	<i>L. walleri</i> from Kibaya
	mm.	mm.	mm.	mm.
Length of premaxillary	66	60	55	57
Length of nasals	74	61	49	54
Length of upper molar series	56	52	46	51

From this may be seen that my specimen occupies an intermediate position between *L. walleri* and *L. sclateri* with regard to these measurements as well which thus confirms the supposition expressed above concerning the subspecific value only of *L. sclateri*.

For the benefit of a future comparison of other cranial dimensions as well, of specimens from different localities the following measurements of my adult specimens from Guaso Nyiri are recorded.

	mm.	mm.
Greatest length of skull (occiput to tip of premaxillary)	229	209
Condylobasal length of skull	219	198
Basiscranial " " "	206	182
Greatest breadth " " "	96	87
Least interorbital breadth	67.5	54
Distance from orbit to tip of premaxillary	106	98
" " " " occiput	107	95
Length of upper molar series	52	50

If BROOKE's figure of a male skull of the typical *L. walleri*¹ is correct, the distance between the proximal end of the premaxillary and the nasal is considerably greater than is the case in my specimen in which this distance is only 7 mm. which, of course, stands in connection with the somewhat longer premaxillary in this intermediate form.

The skull of the Gerenuk displays several very interesting peculiarities to which I will pay attention at another opportunity.

¹ Reproduced in »Book of Antelopes» I. c., p. 231.

The first Gerenuks were seen by this expedition among scattered groups of bushes, and in patches of thornbush on the steppe around Lekundu river south of Guaso Nyiri. In the thornbush country north of the latter river the Gerenuks were common. They were usually seen in small families from three to about seven, but sometimes also single. Good bucks, which are very much larger than the does and the young bucks, are by far not numerous compared with the other specimens. Sometimes I did not see a good buck for several days, although not a day passed without that a good many Gerenuks of small size were observed. The best buck which I saw and succeeded to shoot was single. The habits of these peculiar antelopes have been repeatedly and correctly described (conf. the quotations in the »Book of Antelopes», and in LYDEKKER'S »The Game Animals of Africa», etc.). The Gerenuks are wary, and in some places even shy, so that they do not admit the shooter at a shorter range than about 300 m., and as they, as a rule, only show their long narrow necks they are then by no means an easy target. In the thicker thornbush north of Guaso Nyiri they were less shy, and to a certain extent even curious. In the grey and leaf-less thornbush the stalking sportsman or naturalist often sees at some distance two or three vertical rufous streaks; that is the erect necks of some Gerenuks which stare for some moments at the intruder in their dominion. If they are within reasonable range it is time to shoot, although the bodies are entirely hidden and the necks narrow. But if one moves to continue the stalk the Gerenuks dive down with their necks below the bushes and disappear. As a rule they do not go straight away, but oftener their »long crouching trot» carries them obliquely towards one side or the other. If the sportsman sees the direction, and the thornbush is not too thick, they may often be intercepted by making a short cut because, as a rule, they do not go very far before the rufous necks appear again behind some bush. This may be repeated a couple of times before they disappear completely, or it has been ascertained that there is no good buck in the little flock.

The Gerenuk is in a marvelous manner adapted to the life in the thornbush. Its slender form enables it to slink through narrow openings in the bush, and its sleek coat does not catch in the thorns. The skin is rather thin, except on the neck of the buck where it is thick, but of a soft and elastic, almost rubber-like consistency, unlike other antelope skins.

The Gerenuk is a browser feeding on the leaves, tender shoots, and, during the dry season at least, to great extent on the berries of the different kinds of bushes. Their long and slender legs, long and narrow necks, long, hairy and movable lips enable them to reach high up in the bushes, especially when they rise on the hind legs as they often do. I have had the pleasure of seeing that myself, and I am thus able to testify that the figure reproduced on p. 232 in Vol. III of »Book of Antelopes» depicts two very characteristic attitudes of this interesting animal. There is a very striking analogy in the shape, not only of the neck and head, but also of the lips between a Giraffe and a Gerenuk. Thanks to this wonderful adaptation the Gerenuk is able to sustain itself on such dainty material in this barren-looking desert as the thornbush appears to be during the dry season, that its intestinal canal, as I

intend to describe at another opportunity, can be, and is more simply built than in any other antelope of, or above its size.

The Gerenuks which I shot had their stomachs filled with green leaves and a kind of berries which were of the size of pease and grew erect on the branches of a thorny bush. In the centre was a hard seed, and between that and the skin a white or transparent aromatic and resinous substance.

***Oryx beisa annectens* (HOLLISTER).**

HOLLISTER: *Smithson. Misc. Coll. Washington* 1910, Vol. 56, nr. 2, p. 7.

HOLLISTER has recently described (l. c.) the Oryx-Antelope of the Laikipia Plateau as a new species under the name of *Oryx annectens*. The distinguishing characteristics with regard to the colour are said to be »lateral stripe narrower» than in the true *Oryx beisa* »and head markings somewhat approaching those of *O. callotis*».

The four specimens of *Oryx* which I was allowed to shoot on my license were obtained south of Guaso Nyiri river near its tributary Lekundu river and near the ford on the Marsabit road. These specimens differ from the typical *Oryx beisa* and agree better with HOLLISTER's *O. annectens*, but the characteristics are to some extent variable, as will be set forth below, so that I can only admit subspecific rank to »*O. annectens*».

HOLLISTER's type of »*O. annectens*» is said to have the lateral stripes »reduced to narrow streaks from 8 mm. wide in the middle to 10 mm. wide near the posterior end». In my specimens as well it is often only 8 mm. wide in the middle but widens posteriorly in one specimen to 20, in another to 25, in the third to 20, resp. 25 on the other side, and in the fourth to 25 and 30 mm. resp.

My specimens are thus not so widely different from the typical *O. beisa* as HOLLISTER's type of *O. annectens*, although the difference still is perceptible. The situation of the lateral stripe with regard to the general colouring of the body is as described by HOLLISTER.

The markings of the head appear, however, to offer better characteristics. The stripe through the eye extends higher up to the top of the head, and is also prolonged downwards so that it joins the black throat stripe in all four specimens (only in one of HOLLISTER's specimens). This reminds about the pattern of the head of *Oryx gazella*, and the same is also the case with the broadening of the facial black patch and its extension downwards on the sides of the face so as to actually coalesce with the confluent eye stripe and throat stripe, which takes place in one of my specimens.¹ In two others the distance between the lateral tip of the facial patch, and the eye stripe is reduced to 20—25 mm., in the fourth it is a little more, viz. 30 mm., but scattered black hairs tend to bridge over this interspace in all three specimens.

¹ The same pattern is beautifully illustrated by a photo of an Oryx bull by ROOSEVELT in his »*African Game Trails*», p. 270. This specimen appears to have been killed to the north west of Kenya.

The dorsal stripe is quite absent in one of the specimens, in another it is rather weakly represented on the posterior portion of the back, in a third it extends from the middle of the back to the sacral region, and in the fourth from above the shoulders to the loins.

The black marking on the cannon-bone is only slightly developed on the fore legs, in some instances there is only a black shadow streak, in others it deserves the name of a black spot but not very large. On the hind legs below the hocks one of my specimens is shaded with black on the outside down to the false hoofs. Another has a rather big black blotch $15 \times 4\frac{1}{2}$ cm. on the outside of the cannon bone below the hocks. In the two others this portion of the hind leg is only more or less faintly shaded with black. This variability is of interest especially as these markings remind about the condition of other species.

The following cranial measurements of my specimens prove my best bull to be larger than HOLLISTER's type, but not to such a degree as to cause any doubt as to the racial identity.

	♂	♀	♀	♀
	mm.	mm.	mm.	mm.
Condylobasal length	376	379	372	349
Greatest breadth of skull	152	156	152	145
From orbit to tip of premaxillary	240	241	232	223
Least interorbital breadth	104	107	107	103
Length of nasals	159	159	133	131
Length of upper molar series	107	108	98	105
Length of horns	785	870	820	810
Spread at points	215	200	223	220

All these specimens are fully adult specimens with rather strongly worn teeth. The smallest and the biggest cow were in company when shot. The individual variation in size is thus rather great, as usually is the case with those animals the growth of which is continued through several seasons which are apt to offer different conditions of life. With regard to animals which live in such a country as these Oryx Antelopes do, this fact is quite easy to understand, because a long and severe drought, which is nothing rare there, may make the pasture extremely scanty and of bad quality. This naturally results in starvation for the antelopes, and a stunted growth of the young animals, while those which grow up during a period of favourable rains get abundance of food.

We met with Oryx Antelopes of this kind on the acacia steppe round the tributaries Luazomela, Itiolu, and Lekiundu rivers to Guaso Nyiri. In some places they were quite numerous in this country. They were also seen on the northern side of Guaso Nyiri but were not so numerous in the thornbush there as on the steppe on the southern side.

They occur sometimes single or two or three together, oftener in small herds containing from five to a dozen or more. If the animals are common in a locality

they join to big herds. The largest herd I counted south of Guaso Nyiri in February numbered 43 individuals, but returning over the same steppe in March since green grass had been developed I counted about 90 in one herd (¹⁹ 1911) not far from the ford on the Marsabit road. The *Oryxes* associate often with Zebras, Grant zebras at the southern range of their distribution, but with Grevy zebras nearer Guaso Nyiri and north of this river. Sometimes the herds are mixed in subequal numbers but in other cases a single *Oryx* can be seen among Zebras, or the opposite.

The *Oryx* Antelopes were seen grazing in the morning, and towards evening. Later in the forenoon and about noon they are usually standing quiet, often selecting the shade of an acacia, if such are to be found, or with the head, and as much as possible of the body, under some big bush. In the thornbush country north of Guaso Nyiri grows a kind of funnel-shaped, flat-topped acacia-bushes which are much liked by the animals for the shade they give in this hot country. The *Oryxes* are fond of standing to rest under these, and they are then not so shy as usual. One day for instance I came across about a dozen fine animals with very long horns — one of them had only one horn, the other being quite broken away — standing under such bushes about 60 metres from me and my gunbearers. They allowed us for several minutes to stand in full view of them discussing the length of their horns and admiring their beauty before they leisurely trotted off through the thornbush unmolested.

As a rule the *Oryxes* are very shy and wary, sometimes extremely so. It happens sometimes that they appear smitten by some inexplicable terror and gallop away at very long distances kilometres away. In other cases it is no difficulty to approach them to a distance of about a couple of hundred metres. If their curiosity is aroused they may exceptionally stand and stare even if the dangerous object is not very far from them. One day when Mr. CUNNINGHAME and I were stalking (in vain) a Giraffe and were lying down behind a low ridge to wait for a good opportunity to continue our work, a very fine *Oryx* bull passed about 40—50 metres from us. When he saw us he stopped and looked at us. He did not mind that I sat up, produced my Zeiss-glass and examined him most carefully. For minutes he stood there, although nothing was hiding us from him; C. and I were talking about him, he made a few steps now and then, stopped again, and finally continued his walk. So different can the behaviour of wild animals be.

In some shades of light the general colour of the *Oryx* blends very well together with the dry grass and the leaf-less bushes, but of course there cannot be spoken about protective colouration in such a case as this. I found often that the straight black horns was the first thing of an *Oryx* that was observed by the human eye.

The *Oryxes* are commonly preyed upon by Lions in these regions as was proved by «kills» found.

ROOSEVELT found very young *Oryx*-calves in September and assumes this month to be the regular calving-time of this species. As the calves which I saw in February were rather well grown, this observation may be confirmed, but the number of calves seen by me was comparatively small. The 12th of March I saw a quite young calf

with his mother, and another *Oryx* in the thornbush below Chanler Falls. This proves that the calving season is not quite regular.

Tragelaphus haywoodi THOMAS. (?)

THOMAS: Proc. Zool. Soc. London 1905, p. 181.

Unfortunately I did not succeed in obtaining any Bushbuck when I visited such places as Escarpment, and Meru boma where antelopes of this kind were to be found. In the dry country, where we spent most of the time collecting, no Bushbucks live. Twice the natives brought Bushbuck-skins for sale but as they were very badly mutilated I did not care to buy them. The first time this happened near Escarpment station. That skin was dark without any stripes only with some few spots. The second skin of Bushbuck was shown to me some distance south of Meru boma. It was about chocolate-brown with one faint transverse stripe, and some few spots which also were rather faintly developed.

To judge from the locality, at least the latter skin, and probably the first as well, ought to have belonged to the Kenia race of Bushbucks which THOMAS has named as above. THOMAS type which was from Nyiri, a locality intermediate between these two, had, however; three inconspicuous transverse whitish stripes on each side. No longitudinal bands, but a few white spots on the sides of the rump. The number of transverse stripes is thus variable in the Bushbucks of the Kenia district.

Boocercus¹ eurycerus isaaci THOMAS.

THOMAS: Ann. & Mag. Nat. Hist. 7 Ser. Vol. 10, 1902, p. 309.

At Meru boma I bought a pair of Bongo horns from a native. The animal had been caught in a pitfall somewhat to the southwest of Meru boma, and as far as I could make out, in the upper forest region on the northeastern side of Kenia. Length along the front curve nearly 79 cm.; in a straight line 69 mm.; basal circumference $29\frac{1}{3}$ cm.; from tip to tip 29 cm.; greatest spread (outside) nearly 44 cm. As only a part of the skull remains the only measurement of value to be recorded is the least interorbital width which is 108 mm.

I saw also the skin of this animal, but it was very mutilated and in a bad state so that I did not care to buy that. It was dark chestnut red with 12 white flank stripes. The dorsal stripe was mixed black and white.

About the end of March when the expedition passed through the mixed bamboo and forestregion on the eastern side of Kenia spoors and droppings of Bongo were seen at an altitude of about 2,700, in the same tract where the *Hylocharus* appeared

¹ Although THOMAS plainly has stated that he has given this name in consequence of the bovine tail of the Bongo several authors wrongly spell *Boocercus* (!) as if the name referred to the horns!

to be common. From a zoogeographical point of view it is of interest to note that these two typical forest animals extend so far (north)east.

Concerning the habits of the Bongo I am indebted to Lord DELAMERE for the following notes: The Bongo lives in herds which may count up to 20, yes even sometimes 30 individuals, to judge from the spoor. They move up and down the mountain sides at certain seasons to escape the Wandorobbos. The latter live during the dry season at, or above the forest line to get honey from the bees. The Bongo is then lower down in the forest. In the rainy season the Wandorobbos move down, and the Bongo up. The Wandorobbos pursue the Bongo sometimes with barking dogs, and the Bongo makes a stand against the dogs. The Bongo feeds exclusively on leaves and branches, never on grass. It seldom if ever goes outside the forest. If it happens to come to an open grass-covered spot in the forest it passes straight across without stopping to feed. When browsing the Bongo walks along all the time, never standing still, but it rests lying in some very dense thicket for some hours for instance from 10 a. m. to 3 p. m., or something like that. When browsing it makes rather much noise breaking branches and twigs.

Taurotragus oryx pattersonianus LYDEKKER.

LYDEKKER: Nov. Zool. Vol. 14, 1907 p. 325.

The Eland is rather rare in those parts of British East Africa where I had the opportunity of studying the fauna. Only twice during the whole expedition I had the pleasure of seeing these splendid animals. The first time was on the steppe between Luazomela and Itiulu rivers. A small herd consisting of four cows and a fine blue bull got wind of the safari at a very long distance and ran away with greatest possible speed in a great curve up the wind, so that I could only watch them through my Zeiss-glass. The second time was (3 March) on the northern side of Guaso Nyiri not far from Chanler Falls. A small flock was observed. I did not see any bull among them (but he might have been hidden among the bushes). The animals were very wary this time too, but I got the opportunity of killing a fine cow (Pl. XV fig. 2) at a comparatively long range. Two other cows which were in its company were not scared by the shot, but stopped and looked round, and could then have been shot with greater ease than the first if I had wanted them. These Elands were found in a place where the thornbushes were low and scattered. As the contents of the stomach proved, they feed as well on grass as on leaves and twigs.

The colour of my specimen (Pl. XV fig. 2) agrees with that which LYDEKKER has stated for the type specimen with the differences which are due to difference in sex. The incomplete white chevron is present, but not quite as broad as in LYDEKKER's figure. The black stripe running in the middle line of the forehead of the bull is merely indicated in the cow, but the lower part of the face is dark brown. The forehead and the posterior part of the back have the same colour, a pale but

clear rufous fawn. A mesial black stripe extends along the back to above the withers. It is broader and of a purer black behind, getting browner anteriorly, and finally from the withers and forward along the neck continued in a dull fawn crest. The sides of the head and the neck are light grey, tinged more or less with «pale ecru» (Rép. de Coul. n:o 66,4). The back of the ears pale sandy grey, basally on the outside whitish grey, but the upper half of the outer margin blackish with the duskiess encroaching on the upper posterior surface. The extreme tip is white. There are four white stripes, 5 to 9 cm. apart, across the body in the shoulder region and behind the same. One of these is, however, rather faintly developed. The body colour fades gradually from the back downwards on the sides to pale buff, and finally to white on the lower side. The hams and hind legs are pale ecru. The fore legs more buffish in front and whitish behind with a big black mark situated above the «knee» on the posterior outside, just as is shown on the plate XCVIII in «Book of Antelopes» for the typical Eland. A continuous black band encircles the hoofs and false hoofs as well on the fore as hind legs. This band is about 2 cm. broad, and on the fore leg it sends up a mesial streak in front so as to divide the Tragelaphine white spot above the hoofs in two. On the hind feet again this white mark above the hoofs is undivided. The tail is buff-coloured but with black tuft. In the centre of the lower surface of the body is a large blackish patch with longitudinal extension but not reaching far forward on the chest.

This description has been made out rather detailed because it does not appear to be known how the cow of Patterson's Eland looks, and even the characteristics of the buck appear to be partly unknown as the type-specimen was not complete. As late as in «The Field» newspaper for Nov. 25 1911 Pocock says: «assuming that Patterson's race of the common eland has the feet coloured like Livingstone's eland» — — —. The colour of the feet of Patterson's Eland was thus not known then, but is of interest to find (conf. above) that it is so essentially Tragelaphine.

Another passage from Pocock's above quoted discussion of the colour of the different races of Elands may be fully rendered: «Other points of interest noticed in the Senegambian example were the colouring of the ear, which was black behind in its distal third, with a small white tip, and the presence of a broad black band, also observed in the Soudanese animal, extending along the chest and belly.» A comparison with the description above proves that these markings are present in my specimen of Patterson's Eland as well, which thus shows some signs of affinity with the two mentioned races, although it differs in many other respects.

The dimensions of the skull of this specimen are as follows:

Condylbasal length	413 mm.
Basiscranial	383
Greatest breadth	177 »
Interorbital breadth at upper incisures	100 »
Length of nasals	177
Brim of orbit to tip of premaxillary	248 »
Length of upper molar series	131,5 »
Length of horns	57

The animal was in good condition with the other teeth moderately worn, but the first premolar is very much worn down and appears to indicate a phylogenetic reduction of that tooth.

***Buffelus caffer raddiffei* THOMAS.**

THOMAS: Proc. Zool. Soc. London 1904, p. 371 & 464.

The splendid Buffaloes of those parts of British East Africa where I had the opportunity of collecting my zoological material belong apparently to the same race which THOMAS described from Uganda under the name above.

The first Buffaloes observed by this expedition were seen between Luazomela and Itiolu rivers. The »safari» went across an open grass steppe, but several hundred metres to our left was a thick and extensive thornbush patch in which the Buffaloes were completely hidden. When we had advanced so that the wind blowing across our path and towards the thornbush patch reached the Buffaloes they broke out on the further side of their hiding place in a heavy gallop, their big black bodies surrounded with clouds of dust.

Next time we found Buffaloes on the southern side of Guaso Nyiri near the crossing of the Marsabit road. At this locality as well their covert consisted of thornbush of different kind among which a certain large funnel-shaped and flattopped acacia-bush was most prominent. It appeared striking to me to find Buffaloes in such a dry place as this, as in my mind I mostly had associated these animals with swamps, reed beds, and water. The water was, of course, not far off in the Guaso Nyiri river and some of its tributaries, but there was not a green straw of any kind to be seen. The soil was so dry that a cloud of dust arose when the Buffaloes moved. I got the opportunity of stalking and shooting a fine cow ¹²/₂ 1911 in this thornbush. When found she stood resting with her head close under one of the funnel shaped acacias. Her height in straight line at the shoulders was 138 cm. and the distance from muffle to vent 225 cm. The shape and direction of the horns may be seen from the accompanying figures (fig. 5 a & b).

On the northern side of Guaso Nyiri Buffaloes live here and there in the thornbush, especially below Chanler Falls. Some distance below this place I had — the opportunity of shooting a magnificent herd bull in its best stage of development before the tips of the horns had begun to be worn off. It measured from the root of the tail to the posterior margin of the horn bosses 223 cm. Its height above the shoulders was 150 cm. The palms of the horns were quite close together, as can be seen from the fig. (Pl. XV fig. 3), when the animal just was shot, but in drying they have shrunk apart. Their width across is in a dry state 27 cm. The greatest width outside is 104 cm., inside 93 cm. Distance between the tips 80 cm. The horns of the African Buffaloes vary even in the same herd, some are more widely laid out some are more strongly curved. The difference in appearance in different stages of age is very striking. When the horns have attained a

certain stage of growth, their tips are more and more removed from the mesial line by the growth of the core and the horny sheath. Since the horns have reached their maximum of development again the distance between the inward directed tips is increased by wearing. The smooth tips then by and by become shorter and more blunt. I have seen old specimens in which the tips were entirely worn off so that the ends of the horns were quite truncate.

Characteristics entirely based on the shape of the horns must thus be carefully considered before they are accepted.



Fig. 5 a. *Buffelus caffer raddcliffei* ♀.

All specimens seen by me were covered with hair and looked quite black when alive. A closer examination proves, however, that only head, neck, fore-quarters, back, tail-tuft, a band above the hoofs, and the front side of the legs are quite black. The remaining parts, especially the hind quarters, are dark brown. On the »knees» of the forelegs is a pad of long rather pale brown hair for the protection of the skin when the animals kneel down. Mesially along the posterior part of the upper neck and the anterior part of the back to the whirl behind the shoulders the hairs are bristle-like and attain a length of about 12 cm., but they are not numerous enough to form a conspicuous crest.

I did not see any quite young calves. The smallest were about half grown and had already the colour of the adult.

On the northern side of Guaso Nyiri the Buffaloes had their well beaten tracks along which they went to the water, but they did not appear to use the same every night. Their pasture-lands were mostly situated at some distance from the river. The herd out of which I shot the bull was found about 6—7 kilometres from the river, and at another opportunity I saw a couple of bulls at a still greater distance from the water. During the hottest hours they usually stand resting under some acacia or a big thornbush, but I have also seen them wandering about and grazing about 1 o'clock at noon. They feed on the coarse grass which grows here and there in the thornbush. When they rest they hold the forehead almost horizontal and the large fringed ears droop below the bases of the horns.

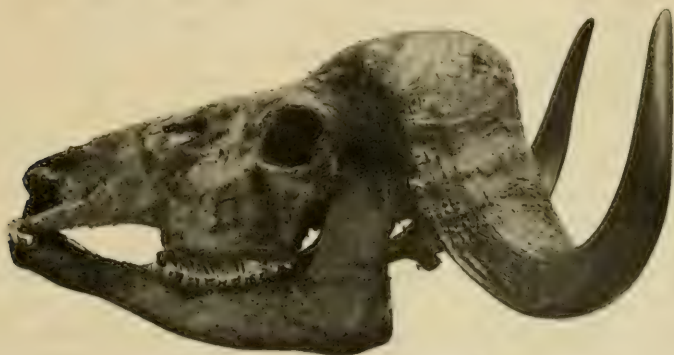


Fig. 5 b. *Buffelus caffer raddeliffi* ..

When badly wounded they give vent to a grunting bellow¹ and even since they have fallen and lie dying they continue with short intervals to utter a kind of moaning bellows at one time melancholic and wild. Their tenacity of life is well known. I shot my specimens with a soft nose 9,3 mm. Mauser bullet, the cow had received two bullets through her chest so that she bled freely on both sides but staggered any way against me ready to charge when she dropped for the third in the brain. The bull got the upper end of the left humerus smashed and the bullet continued into his heart, but he tried to gallop away when a bullet from behind dropped him. The cows of the herd collected then around him evidently bent on a charge but were turned off by some quickly repeated shot from a shot gun.

The Buffaloes, especially the cow, were infested with numerous ticks of the species *Amblyomma hebraeum* Koch² which although widely distributed in East Africa has not been found on this host before.

¹ Some natives told me that it was a sure sign that the Buffalo was severely wounded if he grunted that way. If he was silent after the shot, it was »no good» they said.

² Conf. L. G. NEUMANN: Ark. f. Zoologi. Stockholm. Bd. 7, n:o 24.

The bulk of a Buffalo bull is quite amazing, and few animals give such an impression of powerful strength as he does. One is therefore quite astonished to see the comparative slenderness of its short leg-bones.

In the following table of measurements a comparison can be made between the dimensions of the skulls of the bull and the cow from Guaso Nyiri as well as with the corresponding measurements of a skull of the true *Buffelus caffer* from »Caffraria».

	North of Guaso Nyiri		»Caffraria»
	♂	♀	♂
	mm.	mm.	mm.
Condylbasal length	503	491	—
Basal length	469	461	479
Greatest breadth of skull across orbits	242	222	269
Least interorbital width	149	138	169
Mastoid breadth	285	239	298
Distance from orbit to tip of premaxillary	246	272	273
Length of nasals	184	194	193
Breadth of nasals	68	55	71
Length of upper molar series	131	135	126
Greatest breadth across premaxillaries	115	100	114

The latter is a little superior in most dimensions. The most striking feature in the skull of my Buffalo bull is the shortness of its preorbital region. This may, however, be an individual variation as the corresponding dimension of the cow is longer and almost equal to that of the South African. The length of the nasals stands in direct correspondence with the preorbital length generally in these specimens.

Orycteropus afer subsp.

(Conf. LYDEKKER: The Game Animals of Africa. London 1908, p. 466.)

In the neighbourhood of Nairobi *Orycteropus* was not uncommon, and well known to the natives under the name »Manga». In consequence of its nocturnal habits and because it always spends the days in its deep burrows, it is never seen, and specimens can hardly ever be procured. I saw many times its scratchings and diggings which sometimes may be obnoxious. The termites often make their dwellings in the roads which are made of hard-packed red clay which appears firm as brick. But in spite of this hardness the Manga with its powerful claws is able to break up the road and make deep holes in the same to reach its favourite food, the white ants. One evening in Jan. 1911 I rode with Mr. HAMPSON along the road to his farm and found it without fault, but the following morning when we passed the same way the Manga had done lots of damage and broken up the road in several

places, making big holes which we had to avoid with our mules. Similar things were observed at other opportunities as well, but I could not obtain any specimens.

Mr. KLEIN sent me, however, later a broken and somewhat weather worn skull which enables me to give some morphological notes about this animal.

Distance from anterior margin of <i>foramen magnum</i> to tip of nasal (premaxillary missing)	177 mm.
Distance from anterior margin of <i>foramen magnum</i> to posterior margin of palatina	64 »
Greatest zygomatic breadth	75 »
Least width behind postorbital processes	43 »
Width across tips of postorbital processes	61 »
Least interorbital breadth	57,5 »
Length of frontal suture	61 »
Greatest length of nasals	77 »

The general shape of this skull differs in several respects from the same of *Orycteropus aethiopicus* SUNDEVALL. The skull from British East Africa has the anterior two thirds of the frontals and the posterior portion of the nasals strongly inflated so that their lateral parts bulge up rather high above their median portion. A deep concavity is thus formed mesially on the forehead, while the forehead of *O. aethiopicus* is almost flat, evenly rounded off at the sides. In *O. afer* there is a slight tendency to inflation on the sides, and a median concavity, but by far not so pronounced as in the present specimen. The frontal region is, probably in connection with this, somewhat longer in the present specimen than in the two other species mentioned. The length of *sutura frontalis* is in this specimen 61, but in subequal skulls of *O. aethiopicus* and *afer* resp. about 54 and 52 mm.; on the other hand it will appear that the nasals of the two latter were correspondingly somewhat larger. The bulging of the frontals as mentioned above stands, of course, in connection with an increase of the nasal cavity. In consequence of this the vertical height of the skull from the palatal surface between the last two teeth, and to a place in the middle of the frontal bone measures 52,3 mm. in the present specimen, but only 49 mm. in *O. aethiopicus*. *O. afer* again is nearly equal to the present race. Another result of the same thing is that the forehead of the present specimen becomes much broader than in the two other species the interorbital breadth measuring 57,5 mm., while the same dimension in *O. afer* is 53,5 and in *O. aethiopicus* only about 50 mm.

The tear-duct is in the present species as well as in both the others pierced near the zygomatic suture, but the *jugale* overlaps the *lacrymale* so that the foramen is not so near the lower border of the tear-bone as it appears to be at a superficial examination.

The postorbital processes are well developed and curved downwards.

The width of the snout at the maxillary-premaxillary suture is about 30 mm. in the present specimen as well as in *O. afer*, but only 27 mm. in *O. aethiopicus*. The latter has thus a much slenderer snout which is also more suddenly narrowed than in the two others.

In *O. afer* and *O. aethiopicus* the *parietale* is almost flat, and its profile-contour is only very little, if at all, curved, but in the present specimen the contour line of

the *parietale* forms a very distinct curve so that the posterior portion of the bone slopes quite conspicuously towards the *occipitale*. The parietal is also narrower in its posterior portion than in the other two species so that its least width behind (a little in front of *sutura lambdoidea*) is only 40 mm. while the same dimension is 48,3 mm. in *O. aethiopicus*, and 49 mm. in *O. afer*.

The number of teeth is, of course, of less importance in an *Orycteropus* as the variability in this respect is rather great. The present specimen has 6 teeth in the upper and resp. 6, and 5 teeth in the lower jaw.

With regard to the shape of the lower jaw this skull is most similar to *O. afer*, because the *processus coronoideus* of *O. aethiopicus* is much higher.

On the whole this skull from Brit. East Africa shows more affinity with the South African *O. afer* than with the Abyssinian *O. aethiopicus*, but it differs conspicuously from both and represents without doubt a separate subspecies.

MATSCHIE has described a race named by him *O. wertheri* from Bagamoyo hinterland, but the skull of that race does not appear to be known yet as MATSCHIE had stated in a letter to the present author.

In the year 1908 LYDEKKER named (conf. l. c. above) 'the Somali ant-bear' '*O. a. somalicus*'. No description of this animal was, however, given. The only communications about it are that it is 'rather smaller but closely allied' to the Abyssinian race, viz. *O. aethiopicus*, and that 'the basal diameter of a skull in the British Museum is 7⁵/₈ inches'. It is evidently quite impossible to identify a species on such a scanty communication, and it had been better not to give any name when no diagnose was added.¹ As a matter of fact the present specimen from British East Africa is more allied to the southern *O. afer* than to *O. aethiopicus* and not smaller than the latter, but from a zoogeographical point of view it could be expected that the same race occurred in Brit. East Africa as in Somaliland. Therefore I took the liberty of writing to my friend Mr. LYDEKKER and asked for further communication about his '*O. a. somalicus*'. He then kindly replied: 'As regards the Somali ant-bear I find that the anterior portion of the frontals and the base of the nasals is distinctly convex, with a hollow median line between the convexities'. This indicates thus a resemblance in shape of skulls between the present specimen and the Somali race, and I was therefore inclined to use the name *O. a. somalicus*. Later, however, LYDEKKER added in another letter the information that the type skull of his *O. a. somalicus* has a 'minimum postorbital breadth' of 54 mm. and this proves that the specimen from Nairobi cannot be referred to *O. a. somalicus* as its minimum postorbital breadth is only 43 mm. In this respect the difference between the present specimen and '*O. a. somalicus*' is even greater than that between the former and *O. afer* in which I have found this measurement to be about 47 mm.

¹ DRAKE-BROCKMAN when writing about 'the Mammals of Somaliland' has not accepted LYDEKKER's name but called the 'Antbear' of that country *O. aethiopicus* SUND.

Appendix.

The domesticated mammals in the Kikuyu country were Goats, Sheep and Cattle. The latter was a small breed of humped cattle with short horns. The Sheep were different in colour, some were brown, some brown and white and so on, and provided with a short, rounded fat-tail. They were hornless and hairy. The Goats had short horns or were hornless. Their colour was very variable white, greyish brown, black and so on.

In the Meru country the cattle was a small breed of humped cattle with short horns, or without such appendages. The Sheep were brown, black, black and white etc. all hairy and without horns, and the Goats similar to those of the Kikuyus.

The nomadic tribes on the northern side of Guaso Nyiri have also Camels. The Rendiles at Njoro had very great numbers of Camels. Their Sheep of which they also had great herds were all white with black head (conf. Pl. XV fig. 4) They were all hornless, some had cylindrical normal tails, and others had short fat-tails. The Goats had short horns and had variable colour as brown, black, white etc. (Pl. XV fig. 4).

The 28th of Febr. near Thera I met in the thornbush a Rendile (or Samburu) with a large herd of cattle all of which were of the humped race, but otherwise very much varying in colour and other characteristics. Some had short horns, and some very long horns reminding about Uganda cattle. But in a third lot the horns were hanging loose in the skin. This man had also donkeys.

The next day I met a Samburu with a large herd of Sheep and Goats. The greatest number of the former were white, or white with black head, others were brown with the skin of the neck hanging loose, and provided with fat-tail. The Goats were mostly white, or greyish brown with small horns.

The Samburus had also dogs with erect ears and strongly curved tail. In their size and appearance they resembled the «Grey Dogs» from Jämtland and northern Sweden, but they were red in colour (some also white).

Pl. I.

- Fig. 1. Skull of an old male of *Colobus abyssinicus kikuyuensis* LÖNNBERG (type) from Escarpment, British East Africa.
 Fig. 2. Skull of *Papio anubis furax* ELLIOTT from the northern side of Guaso Nyiri, frontal view.
 Fig. 3. The same as fig. 2; lateral view.
 Fig. 4. Skull of *Papio anubis doguera* PUCH & SCHIMP. from the northern side of Guaso Nyiri below Chanler Falls; lateral view.

Pl. II.

- Fig. 1. Skull of an old *Papio anubis doguera* PUCH. & SCHIMP. from the northern side of Guaso Nyiri below Chanler Falls; frontal view.
 Fig. 2. Frontal view of the same skull as represented by Pl. I, fig. 4.
 Fig. 3. Head of a male *Mungos sanguineus rendilis* LÖNNBERG; lateral view.
 Fig. 4. Skull of *Helogale hirtula ahlsetti* LÖNNBERG, seen from above.
 Fig. 5. The same as fig. 4, lateral view.

Pl. III.

- Fig. 1. *Myosorex sorelloides* LÖNNBERG from Itiolu river Brit. East Africa. Nat. size.
 Fig. 2. *Heterocephalus glaber progrediens* LÖNNBERG from the northern bank of Guaso Nyiri. Nat. size.
 Fig. 3. Head of the same anterior view. $1\frac{1}{2}$ nat. size.
 Fig. 4. Hindfoot of the same to show the hair fringes. Twice enlarged.
 Fig. 5. Palate of the same three times enlarged to show hair on the inside of the mouth, the structure, of the palate and the teeth.

Pl. IV.

- Fig. 1. *Galago (Otolemur) kikuyuensis* LÖNNBERG (from a photo of the mounted type specimen) from the forest at Escarpment station.

Pl. V.

- Fig. 1. *Helogale hirtula ahlsetti* LÖNNBERG (from a photo of the mounted type specimen) from the thornbush north of Guaso Nyiri.

Pl. VI.

- Fig. 1. *Ecilis leo somaliensis* NOACK from the thornbush north of Guaso Nyiri.
 Fig. 2. *Hystrix galeata* THOMAS from the steppe near Itiola river.
 Fig. 3. *Elephas africanus cavendishi* LYNDEKER, ♂, from Njoro, north of Guaso Nyiri.
 Fig. 4. Posterior aspect of the same.

Pl. VII.

- Fig. 1. An acacia uprooted and broken down by Elephants in the thornbush country between Njoro and Thera north of Guaso Nyiri.
 Fig. 2. A Rhinoceros from the thornbush country north of Guaso Nyiri showing ulcers on the side, and marks of the ribs.
 Fig. 3. *Giraffa camelopardalis reticulata* DE WINTON from the thornbush country north of Guaso Nyiri.

Pl. VIII.

- Fig. 1. Skull of a stallion of *Equus grevyi* OUSTALET from Lekiuundu river. Lateral view.
 Fig. 2. The same. Upper view.
 Fig. 3. The same. Palatal view.

Pl. IX.

- Fig. 1. *Potamochoerus charopotamus kenia* LÖNNBERG, ♀ ad., from the neighbourhood of Nairobi Brit. E. Africa.

Pl. X.

- Fig. 1. Skull of *Potamochoerus charotamus kenia* LÖNNBERG, ♂ ad. Lateral view. The tusks the upper of which were a little malformed have been removed.
 Fig. 2. The same, palatal view.
 Fig. 3. The same, upper view.

Pl. XI.

- Fig. 1. Skull of *Hylochoerus meinertzhageni* THOMAS, old boar. Lateral view.
 Fig. 2. The same, upper view.

Pl. XII.

- Fig. 1. Skull of *Phacochoerus dclameri* LÖNNBERG, ♀ ad. Lateral view.
 Fig. 2. The same upper view.

Pl. XIII.

- Fig. 1. Skull of *Giraffa camelopardalis reticulata* DE WINTON, ♂ ad. Lateral view.
 Fig. 2. The same upper view.

Pl. XIV.

- Fig. 1. *Rhynchotragus quentheri wroughthoni* DRAKE-BROCKMAN from the thornbush north of Guaso Nyiri to show the tapir-like snout.
 Fig. 2. *Cobus ellipsiprymnus canescens* n. subsp. ♂ ad, from Guaso Nyiri below Chanler Falls. The light rump band shows broader on the photo than in reality.
 Fig. 3. *Apyceros melampus rendilis* n. subsp. ♂ ad, from the thornbush north of Guaso Nyiri.
 Fig. 4. Young male of the same race with straight horns, from Thera.
 Fig. 5. Grants Gazelle ♂ ad. of the pale race from Lekundu river south of Guaso Nyiri.

Pl. XV.

- Fig. 1. Grant's Gazelle ♂ ad from Njoro.
 Fig. 2. Cow of Patterson's Eland from the northern side of Guaso Nyiri.
 Fig. 3. *Buffelus caffer radeliffei* THOMAS ♂ ad, from the northern side of Guaso Nyiri.
 Fig. 4. Sheep and goats belonging to the Rendiles in the dry riverbed at Njoro.



Tryckt den 26 juni 1912.



Fig. 1.



Fig. 2.



Fig. 3.

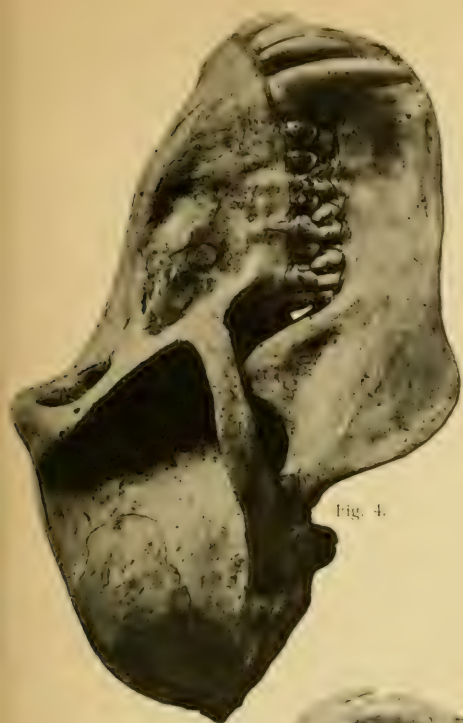


Fig. 4.



Fig. 1



Fig. 2

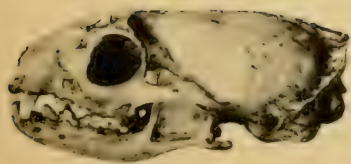


Fig. 3



Fig. 4

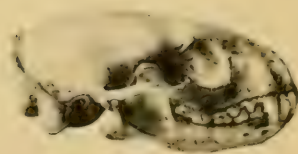


Fig. 5



Fig. 1.

Sylvisorex sorelloides. LÖNNB.



Fig. 3.



Fig. 5.



Fig. 4.



Fig. 2.

Heterocephalus glaber progrediens. LÖNNB.



Hologale hirtula ahlseii. LÖNNB.



Galago (Otolemur) kikuyuensis. Lönnb.



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 1



Fig. 2



Fig. 3

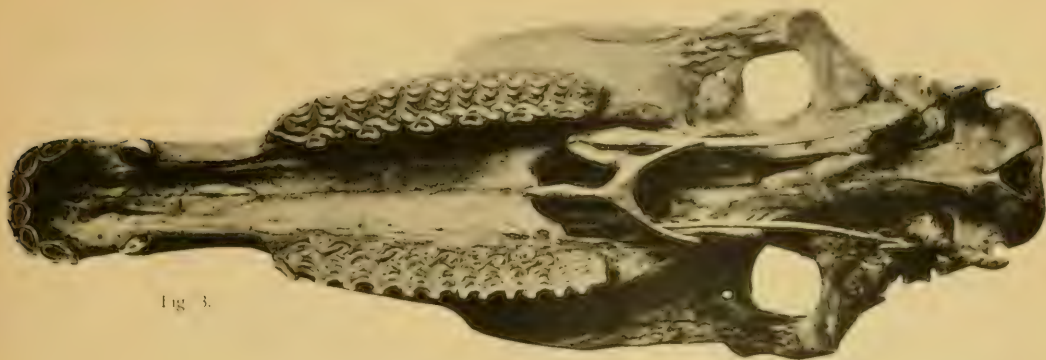


Fig. 3.

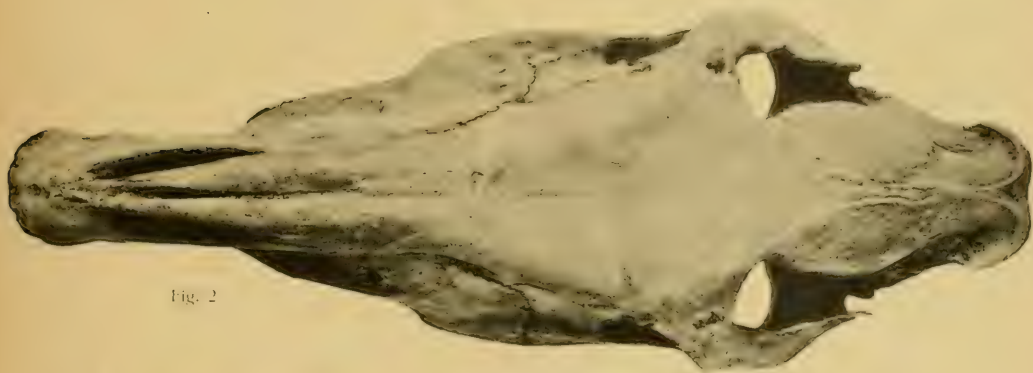


Fig. 2.



Fig. 1.



Potamochoerus chrysopotamus Temm. LÖNNB.

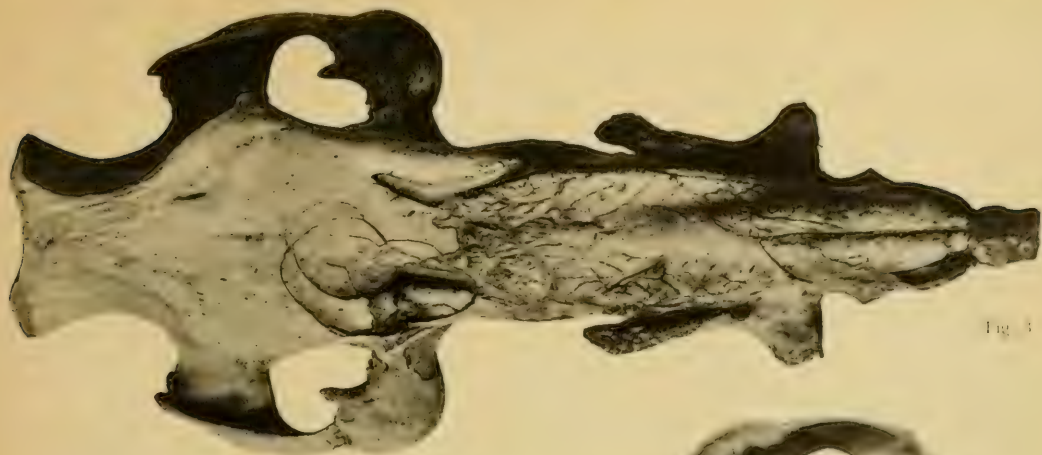


Fig. 3.



Fig. 2.



Fig. 1.

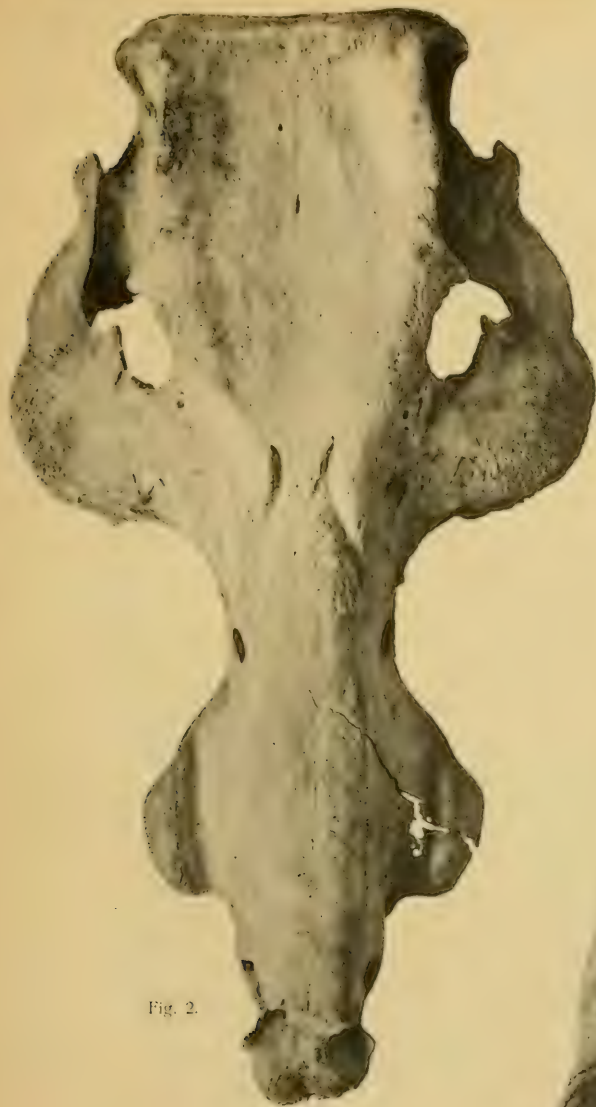


Fig. 2.



Fig. 1.



Fig. 2.



Fig. 1.



Fig. 2.

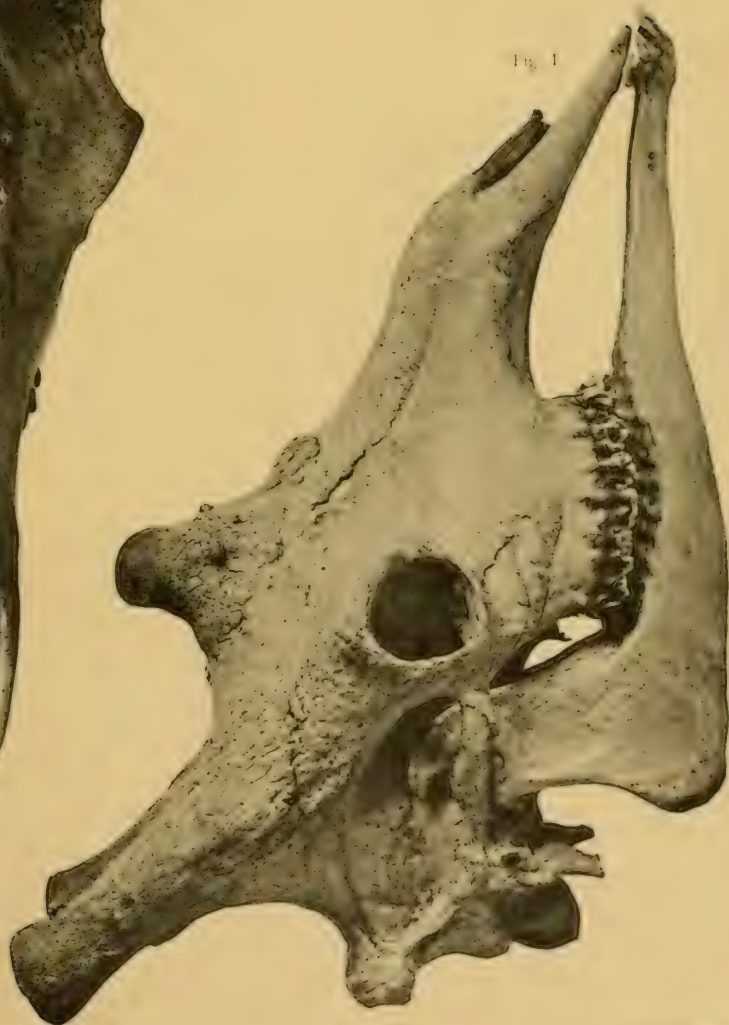


Fig. 1.

Fig. 1.



Fig. 2.



Fig. 3.



Fig. 5.



Fig. 4.



Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.



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